How Parent Communication and the Use of Contingencies Relate to the Responding of Children with Autism Spectrum Disorder During a Compliance Task

Elizabeth E. Snell

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Abstract

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Elizabeth Ellen Snell

I conducted a descriptive analysis of the effectiveness of how mothers communicate with their children during a compliance task and whether the mothers' observed effectiveness related to their self-reported, self-efficacy scores. Participants consisted of 37 mother-child dyads in which the children were preschool-aged and were diagnosed with Autism Spectrum Disorder (ASD). I observed and transduced the mothers' antecedents and consequences, as well as the children's responses, using prerecorded videos that contained a 2-min compliance task (cleaning up after a free-play session). The procedure consisted of identifying the mothers' antecedents and the consequences for the child's behaviors and determining their *form*. Mothers' forms were classified as being either vocal, combined, or nonvocal. The children of the study were classified by their level of verbal development using the *Verbal Behavior Developmental Assessment-Revised* (VBDA-R). The two levels of verbal development utilized for this study were the foundational level and the listener level. Results of the study indicated: 1) mothers of children at both the foundational and listener levels of verbal development were more likely to use a combined approach for antecedents and a vocal approach for consequences, 2) mothers did not significantly differ in their form when communicating based on their child's level of verbal development, 3) children at both levels of verbal development emitted almost equally low levels of correct responding, 4) more antecedents emitted by mothers across both levels of verbal development were correlated with higher incorrect responding by their children, 5) for children

at the foundational level of verbal development, higher incorrect responses were correlated with more combined interactions (antecedents and consequences summed), and for children at the listener level of verbal development, higher incorrect responses were correlated with more vocal interactions (antecedents and consequences summed), 6) mothers of children at either level of verbal development did not significantly differ in their use of contingent consequences, 7) contingent disapprovals were positively correlated with incorrect responses for children at the listener level of verbal development, 8) contingent corrections were positively correlated with incorrect responding for children at both levels of verbal development, 9) mothers' reported self-efficacy was not correlated to their child's level of verbal development, nor was it correlated with their child's correct or incorrect responding.

Table of Contents

List of Tables

List of Figures

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Dedication

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Chapter 1: Review of Literature

Literature Review

Compliance

Complying with a parent's instruction is considered to be an important developmental milestone. At its most basic level, compliance can be defined as being under the stimulus control of a direction, or having the "ability" to hear and/or observe a given directive, and then follow through with the directive (i.e., hear-and-do and/or see-and-do) under specific motivational conditions. In a typically developing child, this ability often develops late in the first year of life to 18+ months of age (Kopp, 1982). During this time, the child begins to show responsiveness to either social or task demands that have been given by his or her parent (Kochanska & Aksan, 1995). Around 24 months of age the child begins to delay his or her own actions upon request and comply with parental demands in the absence of an external monitor (Kochanska, 1993). Said another way, compliance is initially centered around the presence of the parent, but as the child continues to mature developmentally, he or she learns the contingencies of his or her environment and the control shifts from the external presence of the parent to the internal regulation of the child (Kochanska & Askan, 1995). The interaction between parental discipline and child compliance is a pivotal process that is linked to the child's future rule-governed behavior (Kochanska, Tjebkes, & Forman, 1998). The development of a compliance repertoire is essential; it teaches the child to not only follow parental expectations, but societal expectations as well through self-monitoring of his or her own behavior. Teaching a child the rules of society and how to act appropriately with those around them is an essential goal in parenting (Patterson & Fogatch, 1987 as cited in Harden, 1998).

Components of Compliance as Behavioral Developmental Cusps

The ability for a child to comply with a direction does not occur within a vacuum. The child must have certain behavioral repertoires in place in order to acquire skills needed for compliance. For example, the child must be under a parent's stimulus control in order to attend to the presence of the parent, to the voice of the parent, to the actual words or gestures of the parent, and to any object that the parent is referencing. From a verbal behavior development (VBD) perspective, the child would need to have certain *cusps* or *capabilities* in repertoire before demonstrating compliance. As defined by Rosales-Ruiz and Baer (1997), a behavioral cusp is "any behavior change that brings the organism's behavior into contact with new contingencies that have even more far-reaching consequences" (p. 533). The attainment of a behavioral cusp allows the child to come into contact with new opportunities to learn. Greer and Ross (2008) and Greer and Speckman (2009) expanded on the idea of behavioral cusps with *cusps that are capabilities*. These capabilities allow the learner to learn in a new way (e.g., when a child acquires the ability to imitate, they are able to mirror a parent's behavior in order to complete a task). According to Greer and Speckman (2009), some of these behavioral cusps or capabilities are a result of the acquisition of conditioned reinforcement for certain observing responses.

Observing responses. Observing responses are "acquired environment-behavior relations whose primary function is to affect the sensing of stimuli" (Donahoe & Palmer, 2008, p. 156). They consist of looking, listening, tasting, smelling, and touching. Observing responses are necessary for the acquisition and development of foundational skills and language. These operants are selected out by consequences within the environment that reinforce observation, and "the stimuli that reinforce them are established by reinforcement conditioning processes"

(Keohane, Delgado, & Greer, 2009). Observing responses serve as a foundation for more complex behaviors and higher-order operants. Some of the early observing responses relevant to compliance would be attending to adult faces, attending to adult voices, and attending to two- and three-dimensional stimuli (Greer and Du, 2015). Once the child has conditioned reinforcement for these foundational observing responses in repertoire, he or she can begin attending to the contingencies within his or her environment that make learning possible. As stated by Keohane, Luke, and Greer (2008), "As organisms living in a complex environment, we are affected by multiple stimuli from moment to moment. As a result we have developed a singularly efficient method of selecting and attending to stimuli so that we can affect some kind of control over the environment in which we live" (p. 23). With the onset of basic observing responses, a child can begin to interact with his or her environment and the people within the environment. The child is no longer a passive "being" unaware or unresponsive to his or her surroundings, rather, the child becomes an active participant who not only has an intentional effect on his or her environment, but has the capacity to be shaped by the effects of what is happening in the environment.

Verbal behavior development theory. Verbal Behavior Development Theory (VBDT) is a developmental theory that explains the attainment of the aforementioned observing responses as they relate to behavioral cusps and language development. VBDT (Greer, 2008; Greer & Ross, 2008; Greer & Speckman, 2009), which builds upon B.F. Skinner's *Verbal Behavior* (1957), as well as research in Stimulus Equivalence (Sidman, 1971; 1980; 1994), Naming Theory (Horne & Lowe, 1996; Greer & Keohane, 2005; Greer & Longano, 2010), and Relational Frame Theory (Hayes, Barnes-Holmes & Roche, 2001; Hayes & Hayes, 1989), describes the cusps and capabilities that are necessary for learning and language development. These cusps

and capabilities, which have been identified through experimental research, are directly related to the child's level of independent functioning and level of verbal development (Greer & Keohane, 2005). These stages are 1) foundational, 2) listener, 3) speaker, 4) bidirectional (i.e., the joining of the listener repertoire and speaker repertoire in an individual's "own skin"), 5) foundational reader and writer 6) basic reader, 7) basic writer, 8) self-editor, and 9) verbally mediated (refer to Table 1 for the cusps and capabilities associated with each stage; those in bold are particular to the current paper and research).

Table 1

Levels of Verbal Behavior Within VBDT and their Corresponding Cusps/Capabilities

Level of Verbal Development	Verbal Behavior Developmental Cusps and Capabilities
Foundational	Instructional control **Conditioned reinforcement for attending to voices** **Conditioned reinforcement for observing faces** **Conditioned reinforcement for observing 2D and 3D stimuli** Capacity for sameness across the senses
Listener	**Generalized imitation*** Generalized matching **Basic Listener literacy** **Auditory match-to-sample**
Speaker	Parroting Echoic-to-tact Echoic-to-mand Independent mands Independent tacts Transformation of establishing operations across mands and tacts
Bidirectional	Say-do correspondence Self-talk Unidirectional Naming Bidirectional Naming* Bidirectional Naming joins print stimuli
Foundational Reader and Writer	Conditioned reinforcement for observing books Naming accrues from listening to stories Print transcription Dictation
Basic Reader	Textually responding to rate Responding to own textual responses as a listener Reading governs own responding Textually responding joins the Naming capability Conditioned reinforcement for textually responding to printed stimuli
Basic Writer	Joint stimulus control across saying and writing Technical writing that precisely affects the reader's behavior Aesthetic writing that affects the reader's emotions
Self-Editor	Joining of the reader-writer cusps and capabilities
Verbally Mediated	Textually responding to complex operations Technical writing to govern the complex operations of others

Note. Table includes all of VBDT's levels of verbal development and corresponding cusps and capabilities. Bold signifies those applicable to the current paper. * Represents learning capabilities. Adapted from Briggs-Greer (2018).

This study will be focusing on the some of the cusps and capabilities from the foundational and listener stages outlined in VBDT as they are the most relevant stages in terms of compliance. A child who falls under the foundational level is completely dependent on others and generally lacks the ability to engage with the social community. He or she will often have difficulty acquiring new skills and will be dependent on various levels of prompting (e.g., gestures, physical touch) in order to attend to items or directions within the environment. A child who functions at the listener level will have greater independence and can respond more readily to directions, admonishments, and approvals. At this point, the child has entered the social community and is much more of a participant in verbal exchanges with those in the environment (Greer & Ross, 2008).

Foundational cusps. Of the foundational cusps, conditioned reinforcement for attending to voices, faces, and 2D/3D stimuli are crucial in the development of the child's compliance repertoire. When in repertoire, the child comes under the stimulus control of the vocal directions and physical gestures of the parent, as well as the object(s) the parent is referencing. In typically developing children it has been suggested that the pairing of the mother's voice while in-utero establishes conditioned reinforcement for listening to voices (DeCasper & Spence, 1986; Greer & Keohane, 2005; Greer & Speckman, 2009). Additionally, research has shown that newborns orient towards face-like stimuli (Johnson, Dziurawiec, Ellis, & Morton, 1991) with their attention to faces increasing throughout their first year (Frank, Amso, & Johnson, 2014; Frank, Vul, & Johnson, 2009).

When these early cusps do not emerge on their own or are missing, research in VBDT shows how inducing them leads to better outcomes for children. In a study by Maffei-Lewis, Singer-Dudek, and Keohane (2014) the experimenters used conjugate reinforcement to induce

conditioned reinforcement for observing adult faces and/or voices with 4- to 8-year-old students with Autism Spectrum Disorder (ASD). Their study showed an increase in learning as demonstrated by fewer instructional trials needed for acquisition of objectives, as well as an increase in attending to adults' presence in the environment. Greer, Pistoljevic, Cahill, and Du (2011) tested the effects of conditioning adult voices as a reinforcer on observing responses using a voice conditioning protocol (VCP) on preschool-aged children with ASD. They also tested the effects of the VCP on the children's rate of learning for listener curricular objectives (i.e., objectives using only a spoken antecedent), and whether or not the children would select to listen to an adult read a story during free-play. After undergoing the VCP, two of the three children showed a significant increase in observing responses, while the third child showed only a marginal increase in observing responses. All children showed an increase in their rate of acquisition of listener curricular objectives, and two out of the three showed an increase in listening to a story during free-play. Greer et al. (2011) suggest that this demonstrates that conditioned reinforcement for voices may be a prerequisite for learning to respond to vocal instructions.

In addition to observing faces and voices, children must also observe the other stimuli in their environment. In studies by Delgado, Greer, Speckman, and Goswami (2009) and Greer and Han (2015), the effects of a conditioning procedure for observing two-dimensional stimuli with preschool-aged children was conducted. Following the procedure, all participants acquired observation of two-dimensional stimuli and increased their acquisition of academic objectives. Du, Broto, and Greer (2015) tested the effects of conditioning three-dimensional stimuli as reinforcers on match-to-sample responses for two- and three-dimensional stimuli with preschool-aged children with ASD. Results of the procedure showed that three of the four children were

able to match almost all identical and non-identical stimuli across two-dimensional and three-dimensional stimuli, and the fourth child showed an increase in correct responding. Prior to the intervention, instructors had reported that the children did not attend to stimuli within the classroom and struggled to acquire educational objectives. Building on the Du et al. (2015) study, Speckman, Longano, and Syed (2017) also tested the effects of conditioning three-dimensional stimuli as reinforcers on imitation responses and match-to-sample responses for the same population. Across the three children in the study, varying results of the procedure were demonstrated. All three showed an increase in object use imitation and the ability to match identical three-dimensional stimuli. Two of the children showed an increase in matching identical two-dimensional stimuli. The experimenters postulated that the procedure may have conditioned three-dimensional stimuli, thus causing the stimuli to select out the children's observing responses. The ability to attend to stimuli within the environment is a significant developmental cusp allowing a child to not only make academic gains, but to make contact with his or her physical environment in new and meaningful ways (e.g., when a parent gestures or tells the child to look at a stimulus).

Listener cusps and capabilities. Generally as children age, the interest in observing just voices and faces begins to shift to observing what another person is doing (Frank, Vul, & Saxe, 2012). While studying infants and toddlers between 3 to 30 months old, Frank et al. (2012) showed that when viewing faces, younger children mostly observed eyes, whereas older children began observing mouths, especially if an individual was talking or making facial expressions. Older children who were shown more complex scenarios were more likely to observe a person's hands (as opposed to the face), especially when the person was engaging in hand movements, thus demonstrating the shift in observing faces to observing actions. With this transition from

observing faces to observing another individual's actions, the ability to engage in imitative responses can begin to develop.

Moreno (2012) and Greer and Du (2014) used a mirror training protocol in order to teach imitation responses to preschool-aged children with ASD whose imitative repertoire did not emerge naturally. Follow-up probes showed that once the children acquired the ability to reliably imitate taught responses, they were able to generalize this ability into imitating novel responses, thus acquiring the generalized motor imitation (GMI) capability. The capability of GMI allows a child to "see-and-do" which allows for learning from the environment in a way he or she could not before. Baer and Deguchi (1985) highlighted the importance of this capability by stating, "If each imitative behavior needed to be directly trained and reinforced, enormous, unrealistic efforts by parents and teachers would be required to give children even a small amount of the skills necessary for daily life" (p. 185). This new learning capability is an important skill for parent-child interactions as it allows for a parent to demonstrate an action, and the child can then imitate the parent's action (e.g., putting an item in a bag during cleanup).

In addition to developing an imitative repertoire, a child must also continue to develop his or her listener repertoire. To do so, a child must come under the control of the auditory components of another's speech. Children who come under the control of the auditory components of another's speech gain more independence by no longer requiring visual cues to comply with commands (Greer, 2002). In a study by Greer, Chavez-Brown, Nirgudkar, Stolfi, and Rivera-Valdes (2005), the experimenters used a "listener emersion" procedure with eight preschool-aged children with ASD who lacked a basic listener repertoire. The experimenters taught vocal directions to mastery followed by teaching the directions to a predetermined rate. Results showed that the students required significantly fewer trials in order to meet listener

curricular objectives after going through the listener emersion procedure. Greer et al. (2005) hypothesized that since the procedure required the child to respond to a spoken stimulus verses visual prompts, the child came under stimulus control for spoken directions, therefore developing a basic listener literacy repertoire. The ability to follow directions quickly and fluently is an essential component for a child's development as it allows him or her to respond to a parent's direction.

Other experiments within VBDT also illustrate how to induce a more advanced listener repertoire, as well as to demonstrate its importance. Speckman-Collins, Park, and Greer (2007) used an auditory matching procedure for two preschool-aged children with ASD. The auditory matching procedure involved hearing a sound (later progressing from sounds to words) and then matching the sound when presented with two comparison sounds (one being the target sound and the other being a foil). Following the procedure, the two children acquired Unidirectional Naming (formerly known as the listener half of Naming). Unidirectional Naming is the ability to hear the name of a stimulus and then later identify the stimulus in a listener topography (e.g., the child sees a picture of a train while hearing the word "train," and the child later identifies a picture of a train when asked to point to "train"). The experimenters suggest that the intensive exposure to the auditory matching protocol taught the children to better attend to the verbal occurrences within their environment. Choi, Greer, and Keohane (2015) used a more advanced auditory matching procedure (progressing from sounds, to words, to phrases) across two experiments for three preschool-aged children, two of which were diagnosed with ASD and one diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). These two experiments yielded improvements in advanced listener literacy (responding to vocal directions in the presence of a visual distractor), increased accuracy of echoic responses, and increased intervals

of choosing to listen to recordings of adult voices. Choi et al. (2015) theorized that the advanced auditory matching sequence was effective in increasing the reinforcement effects for listening to voices, further advancing the children's listener repertoire. Finally, Du, Speckman, Medina, and Cole-Hatchard (2017) tested the effects of the auditory matching procedure on three preschool-aged children classified as preschoolers with a disability (specific diagnosis was not given). Similar to the results of Choi et al. (2015), their study showed that the children also showed an increase in advanced listener literacy and accuracy of echoic responses. For all three of these studies, the results showed that undergoing the auditory matching procedure and acquiring its associated cusp, had important implications for the listener behaviors of the children involved. Again, these listener behaviors are necessary for a child to have in repertoire for compliance, as they not only improve the stimulus control that words have over the child's behavior, but in some cases, also further condition listening to adult voices.

Parent Efficacy in Shaping Compliance

Once a child has the necessary repertoires to attend to the people and stimuli within his or her environment, it is helpful to break down the relationship between the parent (as a speaker) and the child (as a listener). Almost any parent knows that just because a child functions as a listener, it does not mean the child will follow through with a direction. A parent who continually says, "Clean up your room!" but never consequates the child's behavior, will more than likely have to clean the room himself or herself. The child's behavior of cleaning up does not come under the stimulus control of the parent's antecedent (i.e., the antecedent does not act as a discriminative stimulus (S^D)). The use of contingencies is vital to establishing a parent's antecedent as an S^D. According to Skinner (1957):

> …in the presence of a given stimulus [parent's antecedent], a given response [child's behavior] is characteristically followed by a given reinforcement [parent's consequence]. Such a contingency is a property of the environment. When it prevails the organism not only acquires the response which achieves reinforcement, it becomes more likely to emit the response in the presence of the prior stimulus. (p. 31)

In other words, as the child learns that the parent will "follow through" with a direction, the child begins to respond to the parent's direction correctly and with greater frequency. The child begins to develop a system of "belief" (Skinner, 1957) in what the parent says due to the history of completed contingencies. The reinforcement in this scenario is not considered to be unidirectional though. As the parent reinforces the child's behavior of complying with a direction, the parent also receives reinforcement from the child as he or she has completed the parent's request (Greer, Pohl, Du, & Moschella, 2017).

The bidirectional nature of this relationship can work in an undesirable fashion as well. When a parent is noncontingent, does not reinforce appropriate behaviors, or punishes appropriate behaviors, a coercive feedback loop can be created (Forehand, King, Peed, & Yoder, 1975; Patterson, 1982; Patterson, DeBaryshe, & Ramsey, 1989; Snyder, 1977; Wahler, & Dumas, 1984). The child may begin to use coercive behaviors (e.g., screaming, crying, eloping, hitting) in order to escape aversive demands that have been placed on him or her (Patterson, et al., 1989). When the child does not comply with the parent's direction, the parent's behavior may also begin to escalate. The parent's "normal" speaker behavior becomes punished and transforms into other topographies (e.g., louder tones, gesticulations) that may be more effective in the short term but damaging to the parent-child relationship in the long term. Additionally, the

child may generalize these behaviors that he or she has acquired in the home to other people, settings, and situations.

Whether positive or negative, the bidirectional operants between the parent and child illustrates that the parent as a speaker can affect the child's behavior, and that the child as a listener can affect the parent's behavior as well. Again, it is useful to quote Skinner (1957), "In explaining the behavior of the speaker we assume a listener who will reinforce his behavior in certain ways. In accounting for the behavior of the listener we assume a speaker whose behavior bears a certain relation to environmental conditions" (p. 34).

In examining how contingencies develop, Bronfenbrenner and Morris (2006) discuss the importance of what they term "proximal processes." These processes operate over time and are considered to be the key mechanism by which human development occurs. They assert that the processes are influenced by, "the characteristics of the developing person, of the immediate and more remote environmental contexts, and the time periods, in which the proximal processes take place" (p. 795). For an interaction to be considered a proximal processes, it must occur at regular intervals over an extended period of time, thus creating a type of contingency with the child and his or her environment. Similar to the Skinnerian perspective, Bronfenbrenner and Morris (2006) state "there must be influence in both directions" and "for interpersonal interaction, this means that initiatives do not come from one side only; there must be some degree of reciprocity in the exchange" (p. 798).

Parents' Feelings of Self-Reported, Self-Efficacy

As mothers and fathers establish and develop the contingencies that constitute the basis of their "parenting style," they begin to form their own personal system of beliefs related to their capabilities as parents. Self-efficacy, which Bandura (1977) defined as a person's belief in one's

own ability to perform a particular behavior, is an important concept to consider when examining parent behaviors. These "self-percepts of efficacy influence thought patterns, actions, and emotional arousal" (Bandura, 1982, p. 122). According to Coleman and Karraker (1997):

> "in order for parents to feel efficacious, they must possess the following: a) knowledge of appropriate child care responses (e.g., how to detect infant distress and how to relieve it or what limits should be established for 3-year-olds and how to enforce them), b) confidence in their own abilities to carry out such tasks, and c) the beliefs that their children will respond contingently and that others in the social milieu, including family members and friends, will be supportive of their efforts." (p. 50)

In other words, parenting self-efficacy can be defined as how parents perceive their own ability to act as a "positive influence on the behavior and development" of their children with the knowledge and skills that they have in repertoire (Coleman & Karraker, 1997, p. 58).

Coleman and Karraker (1997) also suggest several categories of task-specific parental self-efficacy beliefs, one of them being the "provision of structure and discipline" (p. 60), which is especially relevant to child compliance. They argue that for a parent to feel self-efficacious in this domain, they would have to have various areas of behavioral competency. These areas would involve devising age-appropriate rules, enforcing these rules, implementing structure, applying appropriate corrective strategies, and assuming responsibility for discipline. They further hypothesize that this could lead to positive outcomes in children, such as behavioral regulation and compliance, respect for authority, absence of behavioral issues, and prosocial behaviors.

Parents of children with ASD experience a range of challenges and stresses not experienced by mothers of typically developing children. According to the Centers for Disease

Control (Baio, et al., 2018) approximately 1 in 59 children (1.7%) have been identified as having ASD. Those with ASD can present as having difficulties across social, emotional, and communicative behaviors. Parents of children with ASD report having lower rates of self-efficacy when compared to parents of children with no diagnosis, parents of children with Down syndrome, parents of children with ASD and Down syndrome, and parents of children with emotional and behavioral disorders (Dumas, Wolf, Fisman, & Culligan, 1991; Smart, 2016). Given that children with ASD face unique challenges it is imperative that their parents have the necessary repertoires to scaffold instruction.

Parents' Interaction Behaviors with their Children with ASD

In order to have effective and meaningful interactions, parents of a child with ASD need to adapt in how they interact with their children. Interestingly, research has shown that parents of typically developing children and the parents of children with ASD engage in a similar quantity of interactions with their children (Doussard-Roosevelt, Joe, Bazhenova, & Porges, 2003; Kasari, Sigman, Mundy, & Yirmiya, 1988), although the topography of those interactions may differ (Briggs-Greer, 2018; Doussard-Roosevelt et al., 2003; Kasari et al., 1988). In their study, Doussard-Roosevelt et al. (2003) found that the quantity of maternal approach behaviors and child responses were similar across mother-child interactions for 24 preschool-aged children with ASD and 24 without ASD, but the types of interactions were different. Mothers of the children with ASD used more physical contact, fewer social verbal interactions, and more high-intensity approach behaviors (defined as a direct attempt to control the child's behavior and to elicit a specific response). They also found that although children with ASD emitted lower response levels to their mothers in general (e.g., ignored the mother's requests or bids for

attention), their level of responsiveness increased when the mother's approach involved greater physical proximity and/or nonverbal object use.

Kasari et al., (1988) studied three groups of developmentally-matched children and their caregivers during multiple caregiver-child interactions. The three groups consisted of children with ASD, children with intellectual disabilities, and typically developing children, all of which were in the developmental age range of approximately 25-26 months. Interactions included: 1) free-play with a variety of toys, 2) free play with specific toys (e.g., doll, bed, bottle), 3) play with a shape-sorting puzzle, 4) a social game, and 5) a cleanup task. Their study showed that parents of children with ASD and intellectual disabilities were equally responsive to their children as parents of typically developing children, however, the parents of children with ASD spent much more time physically holding their children in order to stay on task when compared to the other two groups.

Briggs-Greer (2018) studied the emission of vocal and nonvocal social/verbal interactions between preschool-aged children with ASD and their mothers during a free-play setting. She found that regardless of level of verbal development of the child (e.g., foundational[1], independent, or bidirectional), there was not a significant difference in the number of child-initiated conversational units. However, Briggs-Greer (2018) did find that children at the foundational level often communicated using nonlexical and nonvocal verbal behaviors, which the mothers frequently did not attend to or reinforce. It is plausible that the mother's ignoring of these behaviors could eventually lead to either reduced bids for attention by the child or an increase in maladaptive behaviors due to frustration.

[1]Briggs-Greer (2018) used the term "prefoundational" in her study. As VBDT has evolved, "foundational" is the more commonly used term.

Ostfield-Etzion, Feldman, Hirshler-Guttenberg, Laor, and Golan (2016) examined parenting styles and children's compliance to parental requests (mothers and fathers) with 40 preschool-aged children with ASD, and 40 without ASD using a cleanup task and a delayed gratification scenario. During the cleanup task where the children were asked to pick up toys, the children with ASD emitted more noncompliant behaviors than their typically developing peers. Maternal over-involvement, defined as picking up the toys herself, was correlated with decreased child compliance. The experimenters did not find a difference in disciplinary styles for mothers and fathers of children with ASD when compared to the mothers and fathers of the typically developing peers.

Bryce and Jahromi (2013) measured children's levels of compliance and noncompliance to parental requests during a cleanup task for 20, 4- to 5-year-old children with high-functioning ASD and 20 without ASD. Parental commands were coded as either being unclear, direct, or indirect. The researchers found that the typically developing children demonstrated significantly higher rates of compliance (and low rates of noncompliance) when parents used an indirect command. Conversely, the children with high-functioning ASD demonstrated significantly more noncompliance following a parent's indirect command, thus suggesting that children with high-functioning ASD struggle to infer the parents' intent when indirect commands are given.

Ekas, McDonald, Pruitt and Messinger (2017) compared 21 children with ASD, 49 high-risk children without ASD (defined as having one or more older siblings with ASD), and 41 low-risk children (defined as having no reported family history of ASD) aged 24-36 months on levels of compliance with their mothers during a cleanup task. They found that children with ASD displayed higher levels of passive noncompliance (i.e., not responding to social bids and not attending), but lower initial levels of active noncompliance (i.e., overtly refusing parent requests)

when compared with low-risk children. Of most interest in these findings is that the experimenters attribute higher passive noncompliance rates to receptive language difficulties in the children with ASD. Ekas et al. (2017) suggest that children with ASD may benefit from intensive intervention involving increasing understanding of spoken language and responding to parental requests; this is supported by the research of Greer et al. (2005) relating to the listener emersion procedure.

What these studies tell us collectively is that parents of children with ASD may not be communicating with their children in the most effective ways (Briggs-Greer, 2018; Ekas et al., 2017) and that children with ASD tend to respond differently in terms of compliance when compared to children without ASD (Doussard-Roosevelt et al., 2003; Kasari et al., 1988; Ostfield-Etzion et al., 2016; Bryce & Jahromi, 2013; Ekas et al., 2017).

Rationale for the Current Study

The rationale for conducting the current study was to investigate how mothers communicate and deliver instruction to their child with ASD, and whether mothers communicate differently with their child based on the child's level of verbal development. It also sought to understand if various forms of mother communication correlated with child responding. Finally, the study examined whether mothers' reported self-efficacy was related to her communication forms or her child's responding.

Chapter 2: Procedures of the Study

Method

Participants

The study sample was comprised of mother-child dyads recruited from a preschool that implemented the Comprehensive Application of Behavior Analysis to Schooling (CABAS®) model (CABAS Schools, 2019). The preschool had two separate locations that were each located outside of a major metropolitan area and serviced children with and without disabilities. Recruitment letters describing the study, titled, "Improving Parenting and Enhancing Maternal Wellbeing in Mothers of Preschool Children," were sent to parents. These letters informed the parents that the purpose of the study was to develop interventions for parents that could improve parenting as well as enhance maternal wellbeing. Additional information including what study participation would entail, methods of ensuring confidentiality, and a statement about study compensation ($35 paid at study completion) was also provided. Forty-six mothers responded to the letter to express interest in study participation. Of the mother-child dyads formed from these initial respondents, video data for four dyads were lost, two dyads moved away, two of the children did not qualify as having ASD, and one dyad was excluded in order to control for translational errors, as the mother spoke in her native (non-English) language during the recorded session. This left a final sample size of 37 mother-child dyad videos.

Children in the current study were between the ages of two- and five-years-old (M = 3.65, SD = 0.95) and were previously diagnosed with either a specific medical diagnosis (e.g., Rubinstein-Taybi Syndrome, Angelman Syndrome) or were classified as a preschooler with a disability. Additionally, all children had an Individualized Education Plan (IEP) and had received an Autism Diagnostic Observation Schedule, Second Edition **(**ADOS-2) severity score (Lord et

al., 2012). It should be noted that one child did not receive an ADOS-2 score but did receive a Childhood Autism Rating Scale, Second Edition (CARS-2) score. Therefore, all participants met the clinical diagnostic criteria for Autism Spectrum Disorder (ASD). Descriptive statistics of demographic characteristics for child and mother participants can be found in Tables 2 and 3, respectively.

Table 2

Demographic Characteristics of Child Sample

Demographic Characteristics		Preverbal		Listener	
		N	%	N	%
Gender	M	14	63.64	15	100
	F	8	36.36	0	0
Age	2 years	3	13.64	1	6.67
	3 years	7	31.82	6	40.00
	4 years	9	40.91	3	20.00
	5 years	3	13.64	5	33.33
ADOS-2 Severity Score	Low	2	9.10	2	13.33
	Moderate	8	36.36	5	33.33
	High	11	50.00	8	53.33
	CARS-2	1	4.55	0	0

Note. The CARS-2 assessment was administered to one child who moved away before receiving the ADOS-2 assessment.

Table 3

Demographic Characteristics of Mother Sample

Demographic Characteristics		Foundational		Listener	
		N	%	N	%
Age	26 – 30	1	4.55	1	6.67
	31 – 35	11	50.00	5	33.33
	36 – 40	6	27.27	7	46.66
	41 – 45	4	18.18	1	6.67
	46 – 50	0	0	1	6.67
Marital Status	Married	18	81.82	11	73.33
	Divorced	0	0	1	6.67
	Separated	1	4.55	1	6.67
	Never Married	3	13.64	2	13.33
Race	White	8	36.36	7	46.66
	Hispanic	5	22.73	6	40.00
	African American	6	27.27	1	6.67
	Asian	2	9.09	1	6.67
	Not Reported	1	4.55	0	0
Education	GED	2	9.09	0	0
	Some College	2	9.09	2	13.33
	Associate's	1	4.55	1	6.67
	Bachelor's	10	45.45	6	40.00
	Master's	6	27.27	3	20.00
	Professional	0	0	1	6.67
	Doctoral	0	0	2	13.33
	Not Reported	1	4.55	0	0
Household Income	$0 – $49,999	3	13.64	5	33.33
	$50,000 – $99,999	7	31.82	4	26.66
	$100,000 – $149,999	3	13.64	1	6.67
	$150,000 – $199,999	3	13.64	2	13.33
	$200,000 or more	4	18.18	3	20.00
	Not Reported	2	9.09	0	0

Note. One mother did not report her educational level or household income, one mother did not report her race, and two mothers did not report household income.

Settings and Materials

The mother-child video sessions were recorded at one of the preschool locations in a small private room. The room had a glass door and an adjoining window that looked out onto a street but was covered in order to minimize distractions. The room also had two other doors that led to different locations within the school and a window that looked out into a school hallway. The walls were minimally decorated. Within the room was a child-sized table, two child-sized chairs, and a blue gym mat that was placed in a corner of the room. See Appendices A and B for an image of the room setup. Sessions were recorded using a front-facing camera and a rear-facing camera, both of which were attached to the ceiling. In order to record the mother-child audio exchanges, the mothers wore microphones pinned to their shirts. Experimenters used a timer to record the duration of the different experimental scenarios (described in the Procedure section). During the cleanup task, the mother and child had a variety of items to clean up that had been used in the previous experimental scenarios. These items included: a) a bag of either legos or duplo blocks, b) a reusable grocery bag, c) a bag of crayons, d) coloring pages, e) a magna doodle, f) a play phone, g) a bag of dolls, h) a box of small toy cars, i) and a ball.

The experimenter viewed the prerecorded video sessions in a secure room located on a university campus. The room had two computers that contained all the recorded video sessions. The experimenter used a data sheet and pen to record the mother-child interactions. See Appendix C for an example of a completed data sheet.

Procedure

All procedures followed in the current study were in accordance with the ethical standards of the Teachers College, Columbia University Institutional Review Board (IRB) and

the Fred S. Keller IRB. Informed consent was obtained from the mothers of each dyad prior to the onset of any study procedures.

Prerecorded video assessment procedure. Mother-child sessions consisted of five experimental scenarios: 1) competing demands task (5-min duration), 2) structured task (5-min duration), 3) free-play task (5-min duration), 4) cleanup task (2-min duration), and 5) frustration task (3-min duration). For the purposes of this current study, only the cleanup task scenario was analyzed.

Following the conclusion of the free-play task, the experimenter entered the room while making a comment similar to, "I forgot to give this to your mom!" The experimenter then handed the mother a note that stated it was time to clean up and that she should not clean-up for the child. The experimenter then left the room and started the timer for two minutes. At the conclusion of the 2-min duration the experimenter returned to the room, and if necessary, helped clean up any remaining items.

Target responses and measures. The cleanup task from the prerecorded video session was observed, and the data recorded, at a later time using the data sheet shown in Appendix C. Frequency data were taken on the components of the mother-child three-term contingency. Data were recorded on the data sheet starting with the mother's antecedent, the child's behavior, and then the mother's consequence. The mother's antecedents and consequences were categorized based on their level (vocal, gestural, physical), and the consequences were further categorized as an approval, disapproval, or correction.

Mothers' antecedents. Antecedents were defined as a stimulus change that occurred prior to the child's behavior that implied the child should follow a direction. The word "implied" is used in this instance as many antecedents were considered to be ambiguous to the

experimenters (e.g., *asking* the child if they wanted to clean up, singing a cleanup song, holding a bag out towards the child). Without knowing the preexisting instructional history between a mother and her child, it is difficult to assert what is an ambiguous versus a clear antecedent; therefore, any antecedent that directly or indirectly instructed the child to emit a behavior was counted.

As previously mentioned, antecedents were categorized as vocal, gestural, and/or physical. Vocal antecedents were defined as any vocal utterance that indicated that the child should follow a direction or engage in an action. Vocal antecedents could be a declarative statement, a question, or a song. Gestural antecedents were defined as any hand or body gesture that indicated the child should follow a direction or engage in an action. Physical antecedents were defined as any physical touch between the mother and the child that indicated the child should follow a direction or engage in an action. See Table 4 for how the antecedents were recorded and examples of each antecedent level.

An antecedent opportunity could consist of just one of the category levels or multiple category levels. For example, a mother who said, "Clean up," while holding a bag open with one hand, and physically guiding her child to clean up with her other hand, would have emitted an antecedent using all three antecedent levels (vocal, gestural, and physical). Antecedents emitted more than 1 s apart were considered to be new antecedents.

Table 4

Mothers' Antecedent Codes and Examples

Antecedent Level	Code	Examples
Vocal	V	• "Let's clean up!" • "Pick up the toy." • "Give me that please." • "Do you want to clean up?" • Singing the *Clean Up* Song
Gestural	G	• Nodding towards an item or place • Pointing towards an item or place • Holding a bag open
Physical	P	• Hand-over-hand prompts to put an item away • Touching the child on his/her body in order to direct them • Picking up an item and putting it in the child's hand

Mothers' consequences. Consequences were defined as behavior by the mother that occurred as a result of the child's behavior. Consequences were not only categorized as being vocal, gestural, and/or physical, but also as whether they were approvals, corrections, or disapprovals.

Approvals were defined as any behavior directed towards the child that appeared to commend or endorse the child's behavior. Corrections were defined as any behavior directed towards the child that attempted to correct the child's lack of response or incorrect response. Vocal only corrections were defined as the mother reiterating that she had given a direction previously (e.g., "I *said* _____") in order to distinguish from vocal antecedents. Gestural and physical corrections were distinguished from gestural and physical antecedents by being paired with a vocal correction or if they occurred *immediately* following an incorrect response from the

child. Disapprovals were defined as any behavior directed towards the child that appeared to reprimand or punish the child's behavior. See Table 5 for how each consequence was recorded and examples of each consequence type and level.

A consequence opportunity could consist of just one of the category levels and types or multiple category levels and types. For example, a mother who said, "I told you to clean up," while laughing and hugging the child would have emitted a vocal correction, a vocal approval, and a physical approval.

Table 5

Mothers' Consequence Codes and Examples

Consequence Type	Consequence Level	Code	Examples
Approval	Vocal Approval	VA	• Laughing • "Great job cleaning!"
	Gestural Approval	GA	• Giving a thumbs-up • Nodding head
	Physical Approval	PA	• Giving a high-five • Hugging • Patting the child
Correction	Vocal Correction	VC	• "I said to clean up." • "I told you to clean up."
	Gestural Correction	GC	• Nodding towards an item or place • Pointing towards an item or place • Holding a bag open
	Physical Correction	PC	• Hand-over-hand prompts to put an item away • Touching the child on his/her body to direct them • Picking up an item and putting it in the child's hand
Disapproval	Vocal Disapproval	VD	• "I'm going to leave." • "Stop that!"
	Gestural Disapproval	GD	• Frowning • Squinting towards the child with a furrowed brow • Shaking head back and forth
	Physical Disapproval	PD	• Grabbing the child • Pushing child away • Forcing the child to sit

***Children's behaviors*[2].** Data were taken on whether the child responded correctly to the mother's antecedent or whether the child responded incorrectly to the mother's antecedent. Correct responses were defined as the child following the mother's antecedent within 3 s or before she emitted another antecedent or a consequence. Incorrect responses were defined as the child emitting a response that did not correspond to the mother's antecedent or as not responding within 3 s (e.g., the child continued to engage in the activity he or she was doing when the mother emitted the antecedent). During a response opportunity, it was possible for a child to emit a correct and an incorrect response if they initially complied with the mother's antecedent but then began to emit behaviors that did not correspond to the mother's antecedent (e.g., the mother says, "Clean up," and the child begins putting items away but then starts playing with an item). See Table 6 for how each response was recorded and examples of each response topography.

[2] It should be noted that correct responding in this paper is how the concept of *compliance* was addressed.

Table 6

Child's Response Codes and Examples

Response Type	Code	Examples
Correct	+	• Mother says, "Clean up" and the child places an item in the bag • Mother points to an item and the child picks it up and places it in the bag • Mother uses hand-over-hand to prompt the child to pick up an item and the child complies and picks it up
Incorrect	-	• Mother says, "Clean up" and the child throws an item • Mother points to an object and the child kicks the item • Mother uses hand-over-hand to prompt the child to pick up an item and the child pulls away • Mother says, "Clean up" and the child continues with what he or she was doing before the mother emitted the antecedent • Mother points to an object and the child continues with what he or she was doing before the mother emitted the antecedent

Level of verbal development. The child's level of verbal development was determined using archival data from his or her *Verbal Behavior Development Assessment – Revised* (VBDA-R) (see Greer, 2010 for an in-depth description of the VBDA-R). Children were categorized as functioning at either the foundational level of verbal development or the listener level of verbal development, based on the behavioral cusps and cusps as learning capabilities in their repertoire. It should be noted that the VBDA-R assesses more cusps and capabilities than the ones used for the purposes of this study. Refer to Table 1 for a listing of all the cusps and cusps as learning capabilities associated with the various levels of verbal behavior.

Foundational. The foundational level of verbal development was comprised of five cusps. For a child to be considered functioning at this level of verbal development, he or she had between zero to all five cusps in his or her repertoire, as evidenced by a count of 0-5 on the VBDA-R (Greer, 2018).

Listener. The listener level of verbal development consisted of three cusps and one cusp as a learning capability. In order to be considered as functioning at the listener level of verbal development, the child had to have a minimum count of 7-9 on the VBDA-R. This count could be achieved by a combination of foundational and listener behaviors, but it was required that the child have *both* the listener literacy cusp and the auditory matching cusp in repertoire. Children with a higher count who could be classified at higher levels of verbal development (refer to Table 1) were still included in the listener level.

Reclassification of mothers' behaviors. To investigate how mothers communicated with their children, I examined their communication (antecedents and consequences) as *forms*. Using the raw antecedent and consequence data from the data sheets (vocal, gestural, physical), I reclassified the behaviors as either *vocal, combined, or nonvocal* forms. A vocal form was defined as the mother emitting a vocal utterance only. A combined form was defined as the mother emitting a vocal utterance *in conjunction with* a gestural and/or physical action. A nonvocal form was defined as the mother emitting a gestural and/or physical action only. Antecedents were classified into the following forms: vocal antecedent, combined antecedent, or nonvocal antecedent. When consequences were collapsed across categories (i.e., approvals, corrections, disapprovals), they were classified into the following forms: vocal consequence, combined consequence, or nonvocal consequence. When consequences were separated across categories they were classified into the following forms: vocal approval, combined approval,

nonvocal approval, vocal correction, combined correction, nonvocal correction, vocal disapproval, combined disapproval, or nonvocal disapproval.

Contingent and noncontingent consequences. Consequences were also categorized as contingent or noncontingent. Contingent consequences were defined as consequences that occurred as a direct result of the child's behavior and were appropriate to the child's precedent behavior (e.g., emitting an approval for a correct response or emitting a correction or disapproval for an incorrect response). Noncontingent responses were defined as consequences that were not appropriately related to the child's precedent behavior (e.g., emitting a disapproval/correction for a correct response or emitting an approval for an incorrect response), or were not temporally associated with a behavior. See Figures 1, 2, and 3 for examples of contingent consequences, and Figures 4, 5, and 6 for examples of noncontingent consequences.

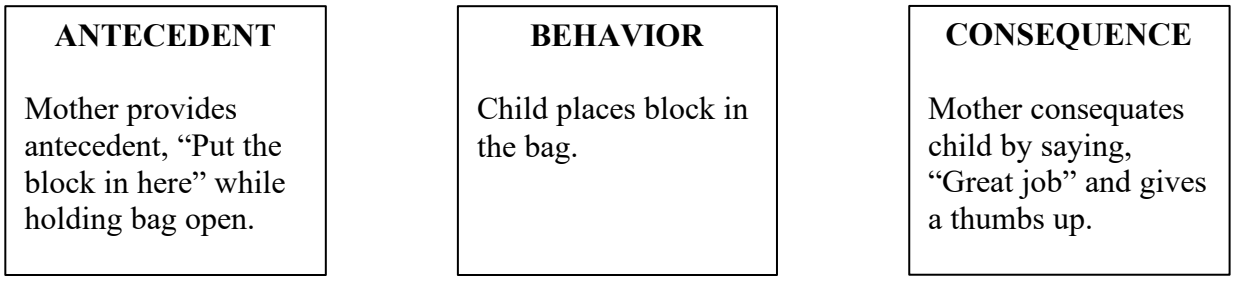

Figure 1. Example of a mother giving an antecedent, the child emitting a correct response, and the mother providing a contingent approval.

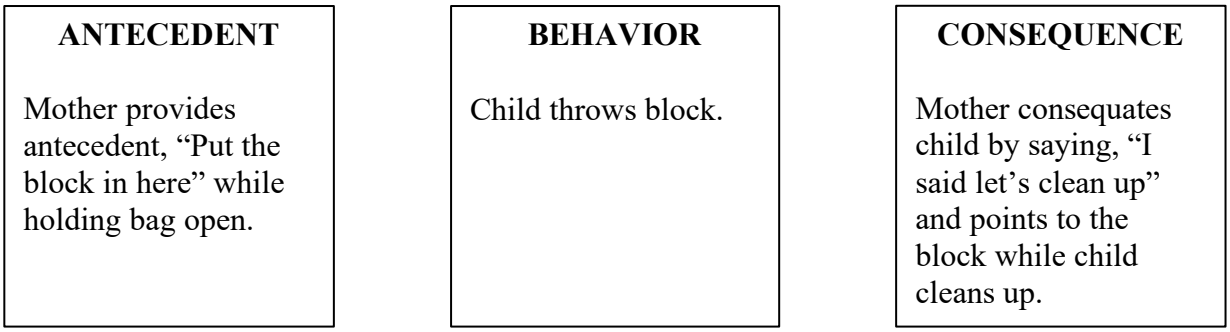

Figure 2. Example of a mother giving an antecedent, the child emitting an incorrect response, and the mother providing a contingent correction.

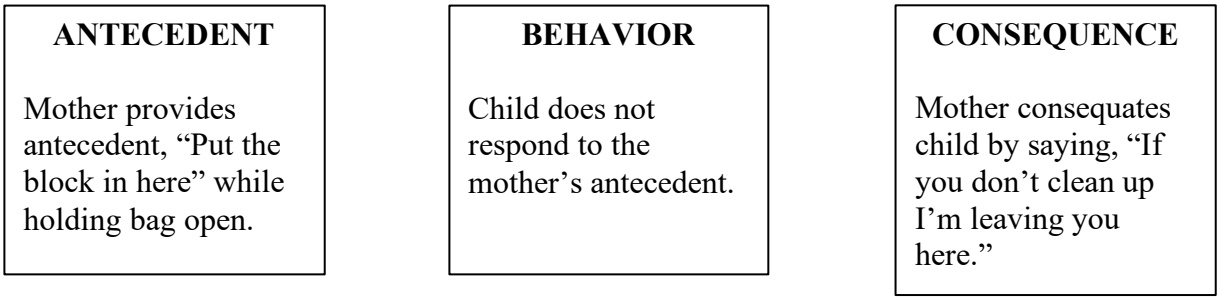

Figure 3. Example of a mother giving an antecedent, the child emitting an incorrect response, and the mother providing a contingent disapproval.

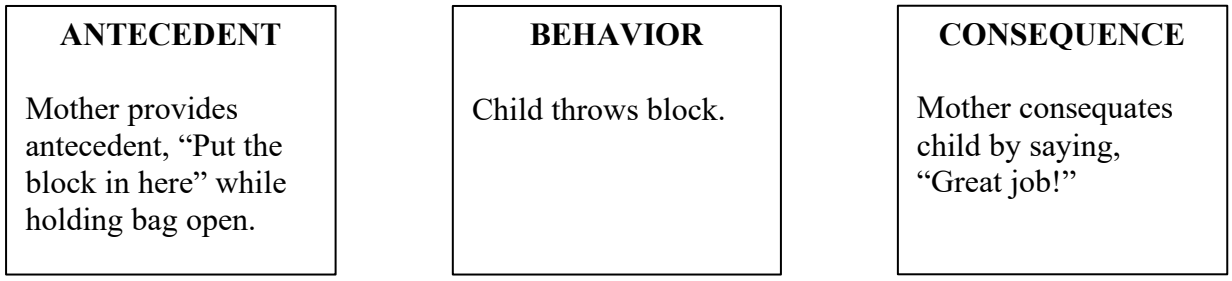

Figure 4. Example of a mother giving an antecedent, the child emitting an incorrect response, and the mother providing a noncontingent approval.

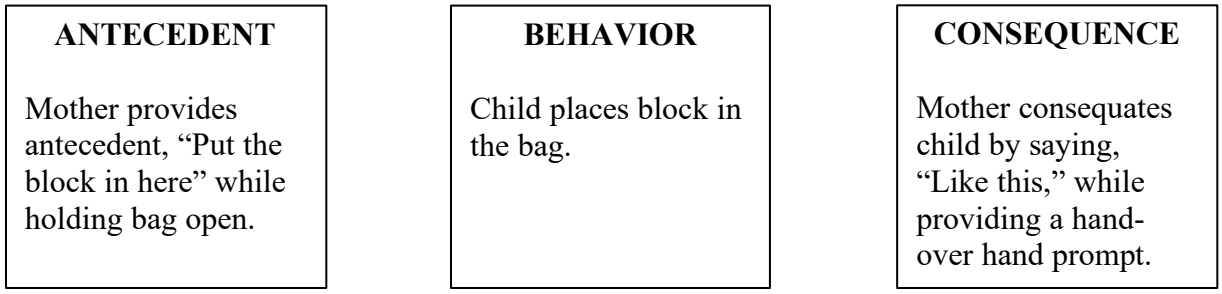

Figure 5. Example of a mother giving an antecedent, the child emitting a correct response, and the mother providing a noncontingent correction.

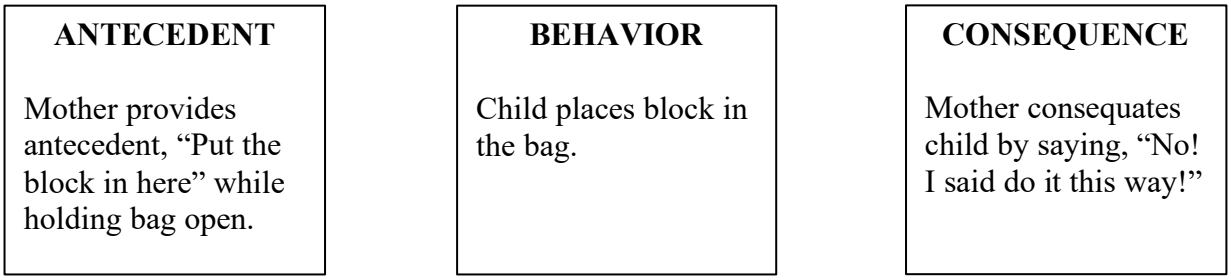

Figure 6. Example of a mother giving an antecedent, the child emitting a correct response, and the mother providing a noncontingent disapproval.

Mother self-efficacy score. Mothers' reported self-efficacy was measured using the 7-item efficacy subscale (see Appendix D) from the Parenting Sense of Competence (PSOC) scale (Gibaud-Wallston & Wandersman, 1978). Using a 6-point Likert scale (1, strongly disagree to 6, strongly agree), mothers rated their perceived efficacy as it related to feelings of competence, the ability to problem-solve, and familiarity with the parental role. The efficacy scale for this study's

sample demonstrated a high-level of internal consistency, as determined by a Cronbach's alpha of 0.86 ($\alpha = .86$).

Interobserver and Interscorer Agreement

Point-by-point and total count interobserver agreement (IOA) were collected for 32% of the videos. Prior to collecting IOA, the experimenter and independent observer discussed the definitions of each behavior and then watched two videos together in order to calibrate data collection procedures. Upon calibration, which was set at 80% agreement or above across two consecutive videos, both the experimenter and the independent observer collected data simultaneously on videos selected at random. Neither the experimenter nor the observer could see each other's data sheet during the data collection procedure. At the end of the video, the experimenter and observer conducted point-by-point agreement for each behavior, followed by total count agreement. Given the complexity of the behaviors being measured, disagreements were reviewed in-situ to ensure that they were in fact "disagreements" and not missed opportunities by the experimenter or the observer (Briggs-Greer, 2018). Point-by-point IOA was calculated by adding the total number of agreements, dividing this number by the number of agreements plus disagreements, and then multiplying the quotient by 100. See Table 7 for the range and mean percentage of point-by-point agreements. Total count agreement was calculated by dividing the smaller number of an observed behavior into the larger number of an observed behavior, and then multiplying the quotient by 100. See Table 8 for the total count IOA for all parent and child behaviors.

Table 7

Percentage of Videos with Point-by-Point and Total Count IOA, the Mean Point-by-Point IOA, and Range of Point-by-Point IOA

Percentage of Videos with IOA	Mean IOA	Range of IOA
32%	95.93%	89.65%-100%

Table 8

Total Count IOA for Parent and Child Behaviors

Parent and Child Behaviors	Total Count IOA
Vocal Antecedents	100%
Gestural Antecedents	99.08%
Physical Antecedents	100%
Correct Child Responses	99%
Incorrect Child Responses	99%
Vocal Approvals	98.43%
Gestural Approvals	66.67%
Physical Approvals	100%
Vocal Disapprovals	100%
Gestural Disapprovals	50%
Physical Disapprovals	100%
Vocal Corrections	86.36%
Gestural Corrections	80%
Physical Corrections	83.33%

Once all the data from the videos were observed and recorded on the data sheet, the experimenter and observer did a frequency count for all parent and child behaviors as forms (see the above section *Classification of Mothers' Behaviors into Forms* for a definition), as well as for parent consequences that were considered either contingent or noncontingent. Interscorer agreement (ISA) was obtained by the experimenter and the observer independently counting and totaling each behavior (i.e., antecedent and consequence forms, contingent consequences, noncontingent consequences, child behaviors). ISA was calculated by dividing the smaller

number of a counted behavior into the larger number of a counted behavior, and then multiplying the quotient by 100. ISA was collected for 100% of the parent and child behaviors on 100% of the data sheets with 100% agreement. See Table 9 for a breakdown of what behaviors were counted and their associated ISA.

Table 9

Parent and Child Behaviors Counted with ISA

Parent and Child Behaviors Counted	Mean ISA
Vocal Antecedents	100%
CombinedAntecedents	100%
Nonvocal Antecedents	100%
Total Antecedents	100%
Correct Child Responses	100%
Incorrect Child Responses	100%
Vocal Approvals	100%
CombinedApprovals	100%
Nonvocal Approvals	100%
Total Approvals	100%
Vocal Disapprovals	100%
Combined Disapprovals	100%
Nonvocal Disapprovals	100%
Total Disapprovals	100%
Vocal Corrections	100%
Combined Corrections	100%
Nonvocal Corrections	100%
Total Corrections	100%
Total Consequences	100%
Contingent Consequences	100%
Noncontingent Consequences	100%

Chapter 3: Results of the Study

Research Questions

Research Question 1

The first set of research questions addressed mothers' use of antecedents and consequences during the clean-up task. Specifically, these questions examined whether mothers used different forms of communication (vocal, combined, or nonvocal) when emitting antecedents or consequences, and whether there were differences in mothers' communication by children's level of verbal development (foundational and listener). Three research sub-questions were tested with respect to mothers' use of antecedents and consequences: 1) Was there a difference, overall, in mothers' use of the three forms when emitting antecedents or consequences, 2) Was there a difference overall in mothers' use of antecedents or consequences based on children's levels of verbal development, and 3) Was there an interaction between children's level of verbal development and forms of antecedents and consequences, such that there was a difference between verbal development levels within specific forms of communication? A 2 (verbal development level) x 3 (communication form) between-within ANOVA was conducted to test these three research sub-questions.

Antecedents. Test results for antecedents revealed that there was a significant main effect for antecedent form, F (2, 34) = 48.53, $p < .001$ indicating that mothers' use of all three forms of antecedents differed. On average, mothers used combined antecedents significantly more frequently, followed by vocal and then non-vocal. See Table 10 for all means and standard deviations. In terms of the main effect for level of verbal development, there was no significant difference between mothers of children at the foundational level and those at the listener level regarding their use of antecedents, F (1, 35) = .733, p = .398. Finally, the results revealed no

significant interaction between level of verbal development and the form of the antecedent, indicating that the difference between forms of the antecedent did not depend on levels of verbal development, F (2, 34) = .497, p = .613. See Figure 7.

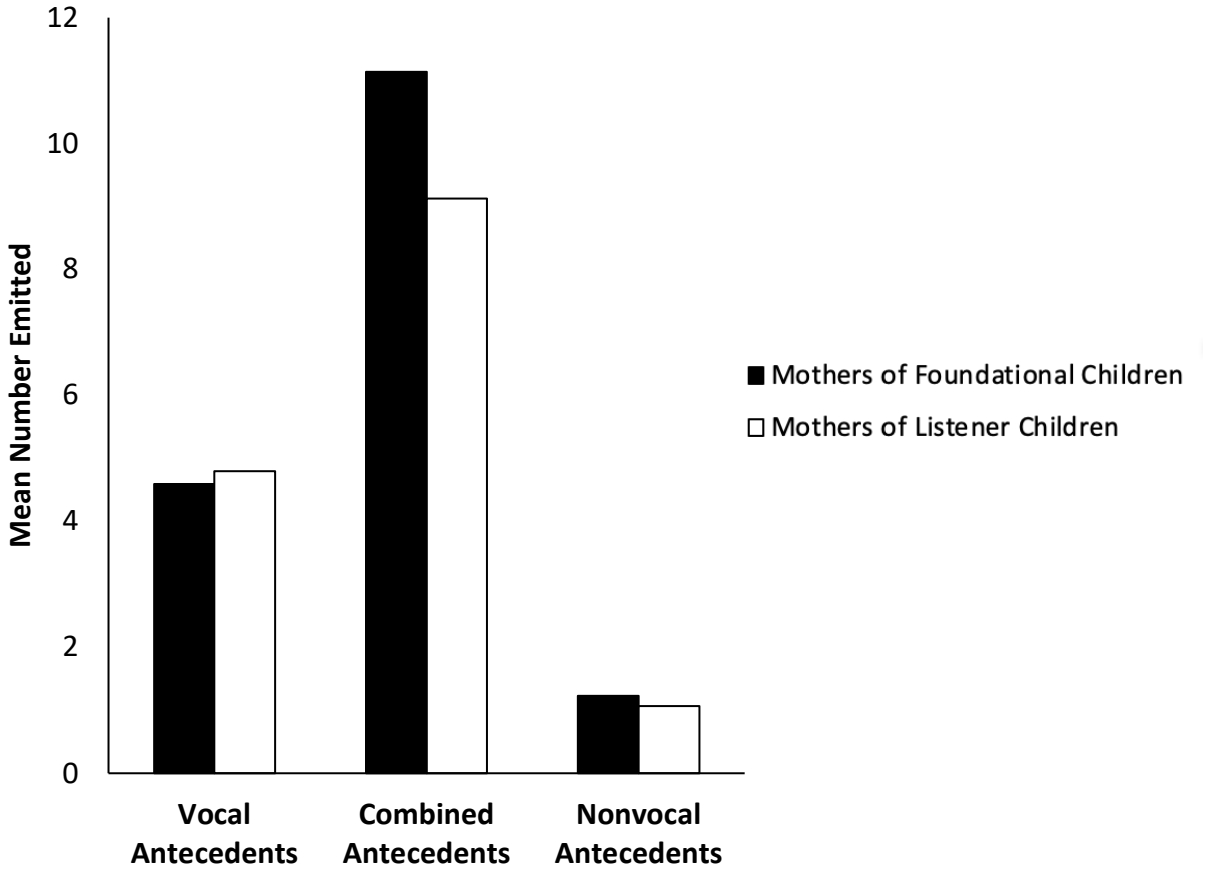

Figure 7. Mean number of antecedent forms emitted by mothers based on the child's level of verbal development.

Table 10

The Mean and Standard Deviation of Antecedent Forms Emitted by Mothers Based on the Child's Level of Verbal Development

Antecedent Form	Foundational	Listener	Total
	Mean (SD)	Mean (SD)	
Vocal	4.59 (3.54)	4.80 (3.51)	4.68 (3.48)
Combined	11.14 (6.15)	9.13 (5.01)	10.32 (5.73)
Nonvocal	1.23 (2.65)	1.07 (1.16)	1.16 (2.15)
Total	16.95	15	16.16

Consequences (collapsed across approvals, corrections, and disapprovals). I next examined consequences (collapsed across approvals, corrections, and disapprovals). Test results revealed that there was a significant main effect of consequence form, F (2, 34) = 45.17, $p < .001$ indicating that, on average, mothers used different amounts of all three forms with vocal consequences used most frequently, followed by combined and then non-vocal. See Table 11 for all means and standard deviations. In terms of the main effect for level of verbal development, there was no significant difference between mothers of children at the foundational level and those at the listener level regarding their use of consequences, F (1, 35) = .517, p = .477. Finally, the results revealed no significant interaction between level of verbal development and the form of the consequence, indicating that the difference between the forms of the consequences did not depend on the levels of verbal development, F (2, 34) = .143, p = .868. See Figure 8.

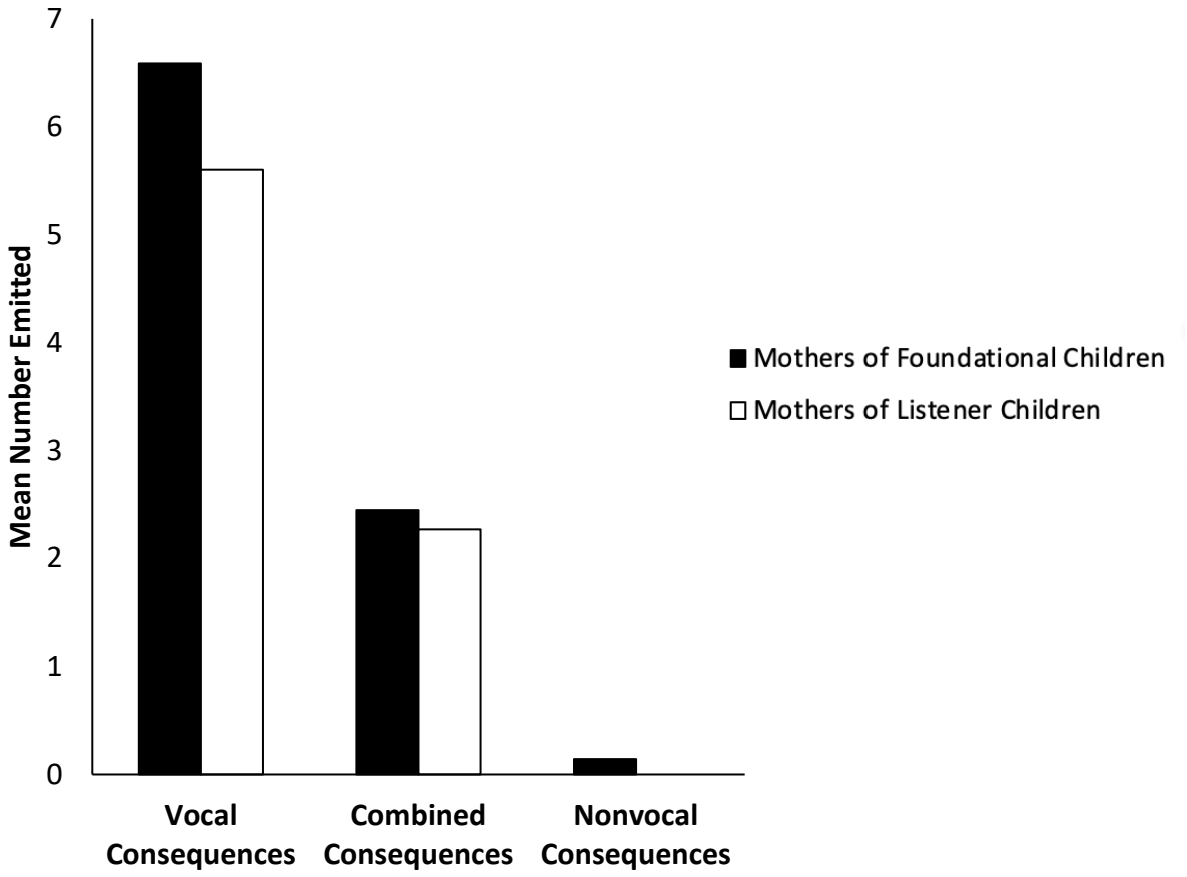

Figure 8. Mean number of consequence forms (collapsed across approvals, disapproval, and corrections) emitted by mothers based on the child's level of verbal development.

Table 11

The Mean and Standard Deviation of Collapsed Consequence Forms Emitted by Mothers Based on the Child's Level of Verbal Development

Consequence Form	Foundational	Listener	Total
	Mean (SD)	Mean (SD)	
Vocal	6.59 (5.74)	5.60 (2.67)	6.19 (4.71)
Combined	2.45 (2.04)	2.27 (2.34)	2.38 (2.14)
Nonvocal	0.14 (0.35)	0	0.08 (0.28)
Total	9.18	7.87	8.65

Consequences (approvals, corrections, and disapprovals separated). Next, 2 x 3 ANOVAs were conducted for each of the three categories of consequences separately. Test

results revealed that there was a significant main effect for forms of approvals, corrections, and disapprovals, F (2, 34) = 20.18, $p < .001$; F (2, 34) = 22.99, $p < .001$; and F (2, 34) = 3.32, $p < .05$, respectively. For approvals, mothers used significantly different amounts of all three forms, with a vocal form used most frequently. For corrections, mothers used a combined and vocal form more frequently than a nonvocal form, but combined forms did not differ from vocal forms. For disapprovals, mothers used a vocal form more frequently than a nonvocal form, but combined forms did not differ from vocal or nonvocal forms. See Table 12 for all means and standard deviations. In terms of the main effect of level of verbal development, there was no significant difference between mothers of children at the foundational level and those at the listener level regarding their use of approvals, corrections, and disapprovals, F (1, 35) = .1.99, $p = .167$; F (1, 35) = .728, $p = .399$; F (1, 35) = .006, $p = .941$, respectively. The results revealed no significant interaction between level of verbal development and the form of the approval, correction, or disapproval, F (2, 34) = 1.05, $p = .363$; F (2, 34) = .985, $p = .384$; F (2, 34) = 1.25, $p = .300$, respectively. See Figure 9.

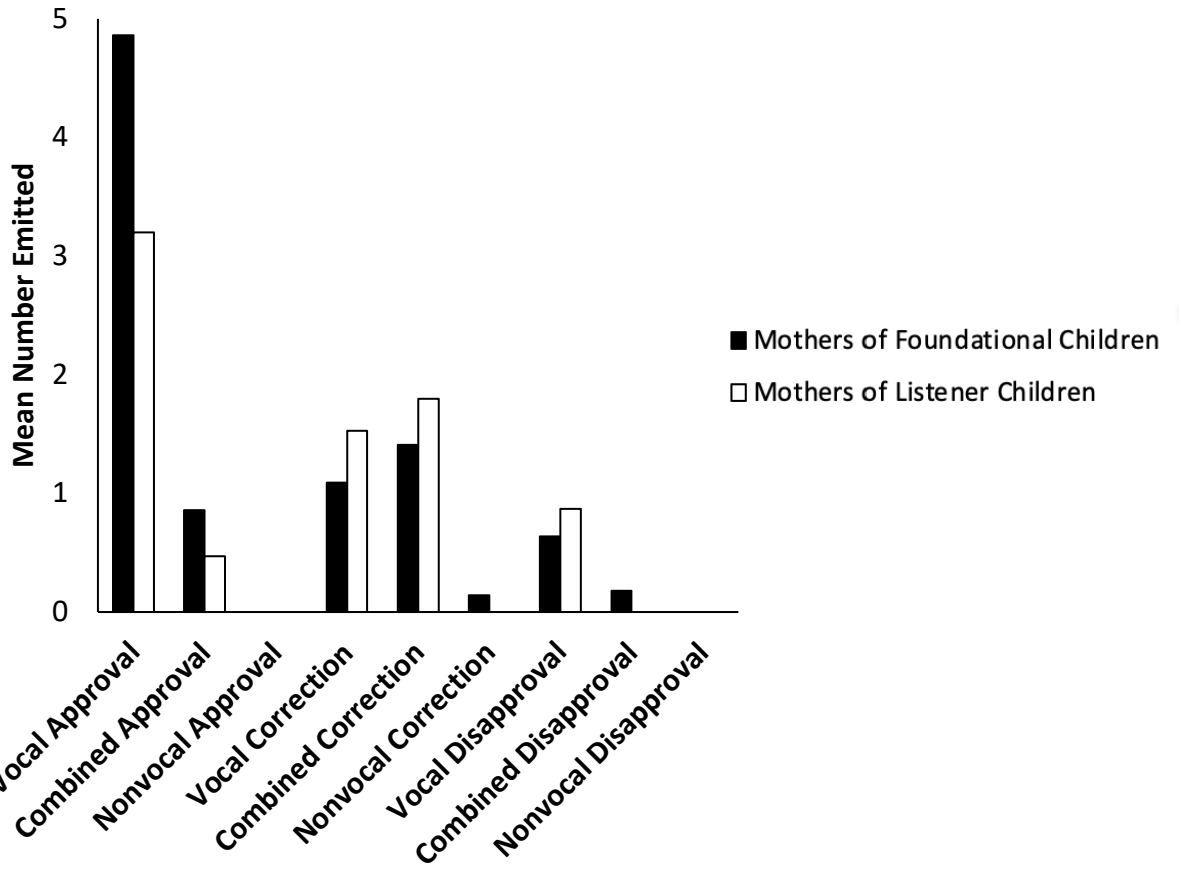

Figure 9. Mean number of consequence forms across categories emitted by mothers based on the child's level of verbal development.

Table 12

The Mean and Standard Deviation of Consequence Forms Across Categories Emitted by Mothers Based on the Child's Level of Verbal Development

Consequence Categories	Consequence Form	Foundational	Listener	Total
		Mean (SD)	Mean (SD)	
Approval	Vocal	4.86 (4.56)	3.20 (2.76)	4.19 (3.97)
	Combined	0.86 (1.21)	0.47 (1.06)	0.70 (1.15)
	Nonvocal	0	0	0
Total		5.72	3.67	4.89
Correction	Vocal	1.09 (1.51)	1.53 (1.30)	1.27 (1.43)
	Combined	1.41 (1.76)	1.80 (2.46)	1.57 (2.05)
	Nonvocal	0.14 (0.36)	0	0.08 (0.28)
Total		2.64	3.33	2.92
Disapproval	Vocal	0.64 (1.92)	0.87 (1.60)	0.73 (1.77)
	Combined	0.18 (0.50)	0	0.11 (0.39)
	Nonvocal	0	0	0
Total		0.82	0.87	0.84

All interactions (antecedents and consequences summed). Finally, mothers' use of antecedents and consequences were summed to be tested as a composite reflecting all interactions. Test results for all interactions (antecedents and consequences summed) revealed that there was a significant main effect for the summed antecedents and consequences, F (2, 34) = 85.84, $p < .001$ indicating that, on average, mothers used combined forms most frequently, followed by vocal and then non-vocal. Combined and vocal forms differed significantly from nonvocal forms, but there was not a significant difference between combined and vocal forms. See Table 13 for all means and standard deviations. In terms of the main effect of level of verbal development, there was no significant difference between mothers of children at the foundational level and those at the listener level regarding their use of total communication forms, F (1, 35) = .939, p = .339. Results also revealed no significant interaction between level of verbal development and the form of the summed antecedents and consequences, indicating that the

difference between verbal development levels did not depend on the form, F (2, 34) = .370, p = .693. See Figure 10.

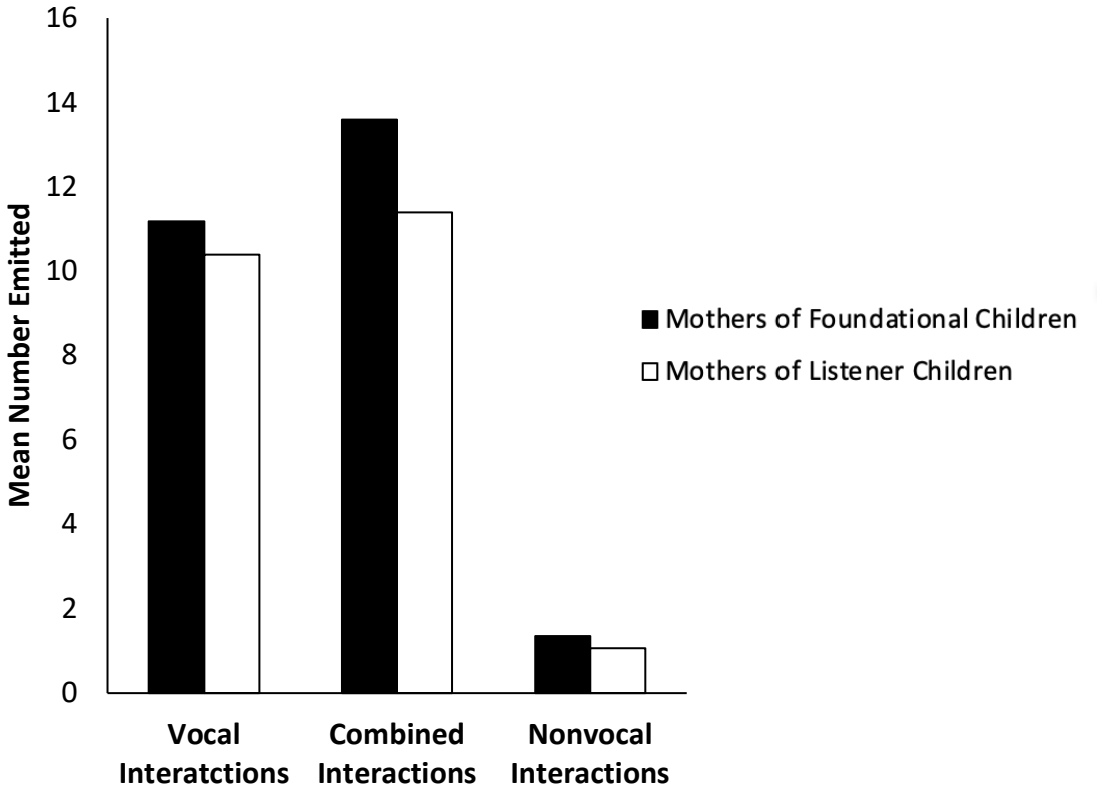

Figure 10. Mean number of types of communication forms emitted by mothers across all interactions (antecedents and consequences summed) based on the child's level of verbal development.

Table 13

The Mean and Standard Deviation of Types of Communication Forms Emitted by Mothers Across all Interactions (Antecedents and Consequences Summed) Based on the Child's Level of Verbal Development

All Interactions Form	Foundational	Listener	Total
	Mean (SD)	Mean (SD)	
Vocal	11.18 (7.49)	10.40 (4.34)	10.86 (6.34)
Combined	13.59 (6.91)	11.40 (6.21)	12.70 (6.64)
Nonvocal	1.36 (2.65)	1.07 (1.16)	1.24 (2.15)
Total	26.14	22.87	24.81

Research Question 2

The second research question addressed whether children's correct and incorrect responses were related to their level of verbal development or to mothers' form of communication. Specifically, this research question asked: 1) Was there a significant difference between children at the two levels of verbal development in terms of their correct or incorrect responses during the cleanup task? and 2) Was there a relationship between mothers' communication forms and children's correct or incorrect responses?

Level of verbal development. There was not a significant difference between children at the foundational level of verbal development and children at the listener level of verbal development in average number of correct responses, $t(35) = -1.018$, $p = .316$, nor in average number of incorrect responses, $t(35) = .070$, $p = .945$, during the cleanup task (see Figure 11 and Table 14).

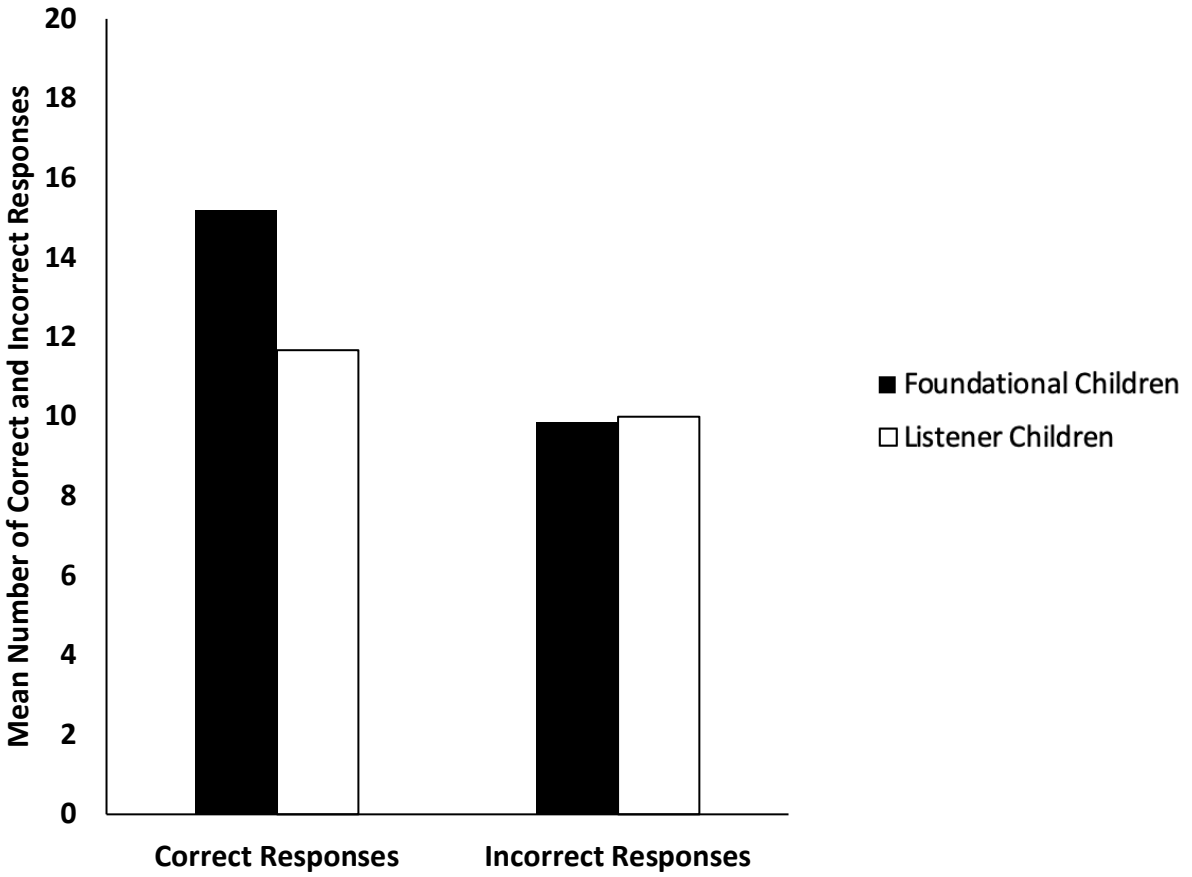

Figure 11. The mean number of correct and incorrect responses for children at the foundational level of verbal development and the listener level of verbal development.

Table 14

The Mean and Standard Deviation of Correct and Incorrect Responses for Children at the Foundational Level of Verbal Development and the Listener Level of Verbal Development

	Foundational	Listener
	Mean (SD)	Mean (SD)
Number of Correct Responses	15.18 (9.37)	11.67 (11.59)
Number of Incorrect Responses	9.86 (5.55)	10.0 (6.29)

Mothers' communication forms. A separate set of bivariate Pearson's correlations were performed for children at the foundational level of verbal development and children at the

listener level of verbal development to assess associations between mothers' communication forms and children's correct and incorrect responses. Figure 12 provides a representation of the significant correlations described below.

Antecedents. Correlations were first performed between the number of child correct and incorrect responses and mothers' communication form occurring as *antecedents*. This analysis revealed that for children at the foundational level of verbal development, none of the mother communication forms (vocal, combined, nonvocal) occurring as antecedents demonstrated a significant relationship with child *correct* responses. In contrast, child *incorrect* responses for this group was significantly and positively related to number of mothers' combined antecedents, $r(20) = .697$, $p < .001$, as well as with mothers' vocal antecedents, $r(20) = .411$, $p = .057$. For children at the listener level of verbal development, this analysis revealed that the number of child *correct* responses was significantly negatively related to vocal antecedents, $r(13) = -.593$, $p = .020$. This relationship was supported by a significant positive correlation between vocal antecedents and *incorrect* responses for these children, $r(13) = .793$, $p < .001$. Frequency of mothers' nonvocal antecedents for listeners was also inversely related to incorrect responses, $r(13) = -.547$, $p = .035$.

When examining overall number of antecedents (i.e., summing vocal, combined, and nonvocal antecedents), results of a bivariate Pearson's correlation indicated that children's c*orrect* behaviors were unrelated to the overall number of antecedents, *regardless* of child's level of verbal development. Bivariate Pearson's correlations also revealed that, for children at both the foundational level of verbal development and listener level of verbal development, more antecedents emitted by mothers correlated to a greater number of *incorrect* behaviors, $r(20) = .725$, $p < .001$, and $r(13) = .684$, $p = .005$, respectively.

Consequences (collapsed across approvals, corrections, and disapprovals). Bivariate Pearson's correlations were next performed between number of child correct and incorrect responses and the mothers' communication form occurring as *consequences* (collapsed across those occurring as approvals, disapprovals, and corrections). For children at both the foundational and listener levels of verbal development, none of the mother communication forms (vocal, combined, nonvocal) occurring as consequences were significantly associated with either correct responses or incorrect responses during the cleanup task, all *p*s > .05.

Consequences (approvals, corrections, and disapprovals separated). The relationship between number of child correct and incorrect responses and mothers' communication forms occurring as consequences was then assessed by separately examining *consequence categories* (approvals, disapprovals, and corrections) for children at the foundational and listener levels of verbal development. None of the mother communication forms (vocal, combined, nonvocal) for consequences occurring as approvals were significantly related to correct or incorrect responses, all *p*s > .05 for children at the foundational level of verbal development. For children at the listener level of verbal development, vocal approvals were positively associated with correct responses, $r(13) = .612$, $p = .015$, and negatively associated with incorrect responses, $r(13) = -.548$, $p = .035$. Combined and nonvocal approvals were unrelated to correct or incorrect behaviors for children at the listener level of verbal development.

Consequences occurring as *disapprovals* were only significantly correlated with incorrect responses when the mother communication form was *vocal*, and this was only the case for children at the listener level of verbal development, $r(13) = .597$, $p = .019$. Consequences occurring as *disapprovals* were not significantly correlated with the number of child correct or incorrect responses during the cleanup task for the other mother communication forms

(combined or nonvocal) for children at either the foundational or listener levels of verbal development, *p*s > .05.

This was also the case when examining consequences occurring as *corrections,* that is, consequences occurring as *corrections* were only significantly correlated with incorrect responses when the mother communication form was *vocal* and this was only the case for children at the listener level of verbal development, $r(13) = .576$, p .025.

All interactions (antecedents and consequences summed). Finally, bivariate Pearson's correlations were performed between number of child correct and incorrect responses and forms of mother communication *across all interactions*. For children at the foundational level of verbal development, none of the mother communication forms were significantly related to *correct* responses, but there was a significant and positive correlation between combined interactions and number of child *incorrect* responses, $r(20) = .616$, $p = .002$. Similarly, for children at the listener level of verbal development, none of the mother communication forms were significantly related to *correct* responses. In contrast, both vocal interactions and nonvocal interactions were significantly correlated with number of *incorrect* responses from these children, $r(13) = .686$, $p = .005$ and $r(13) = -.547$, $p = .035$, respectively.

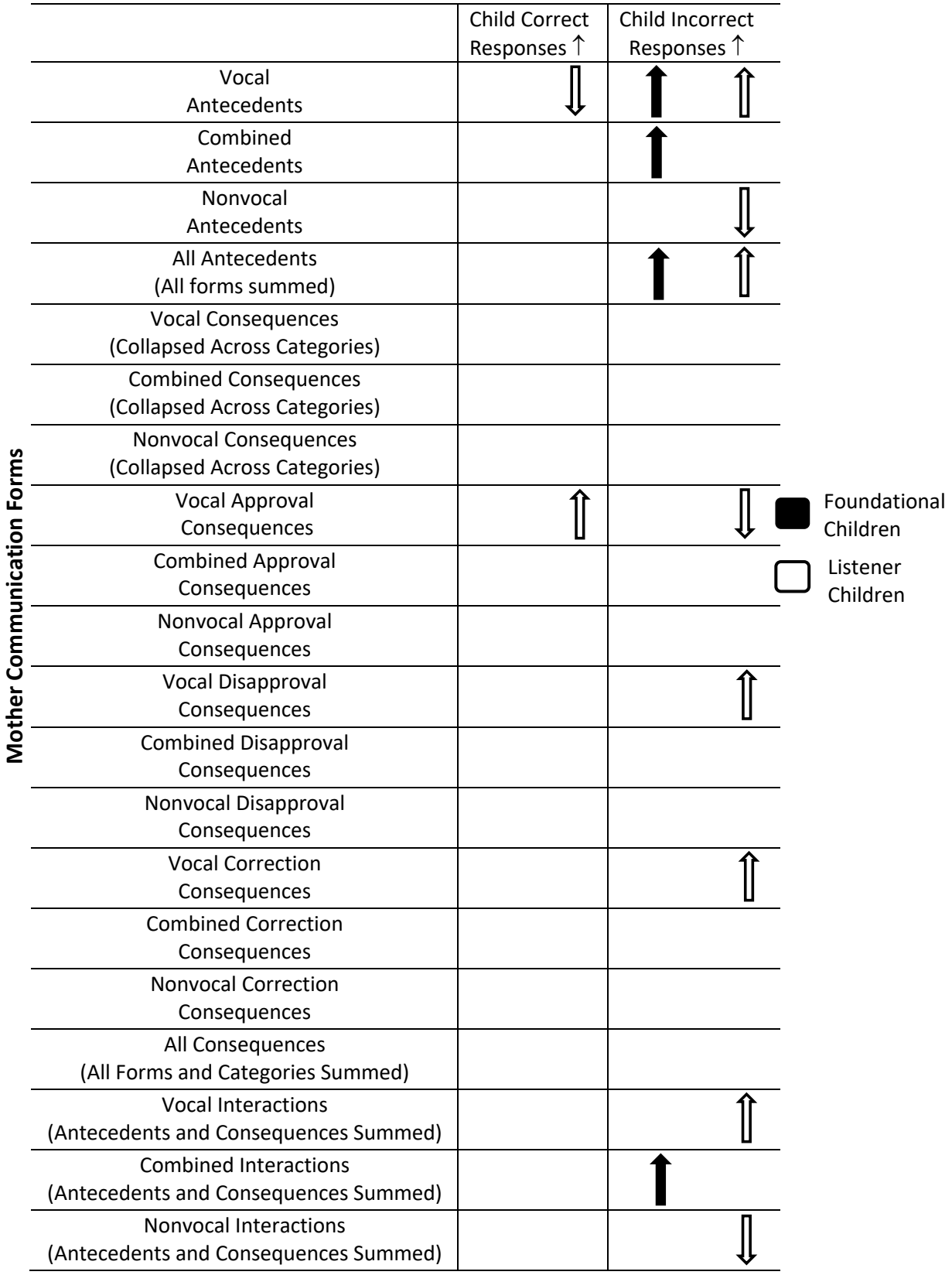

Figure 12. Significant positive and/or negative correlations (as indicated by directionality of arrows) between mothers' communication form and child's correct and incorrect responses.

Research Question 3

The third research question asked: Did mothers of children at the foundational level of verbal development and mothers of children at the listener level of verbal development differ in how often they emitted contingent and noncontingent consequences?

Based on the results of two independent samples t-tests, the data did not provide sufficient evidence that mothers of children at the foundational level of verbal development and mothers of children at the listener level of verbal development significantly differed in their total number of contingent responses during the cleanup task, $t(34) = -.152$, $p = .880$. In contrast, there was a significant difference between the two groups in total number of noncontingent responses, $t(33) = -3.199$, $p = .003$, such that mothers of children at the foundational level emitted more noncontingent responses during the cleanup task than mothers of children at the listener level. Despite this statistically significant difference, this finding may not have clinical significance as noncontingent responses were not common among any of the mothers in this sample, as evidenced by an average of .47 total noncontingent responses from mothers of children at the listener level and 1.45 from mothers of children at the foundational level (see Figure 13).

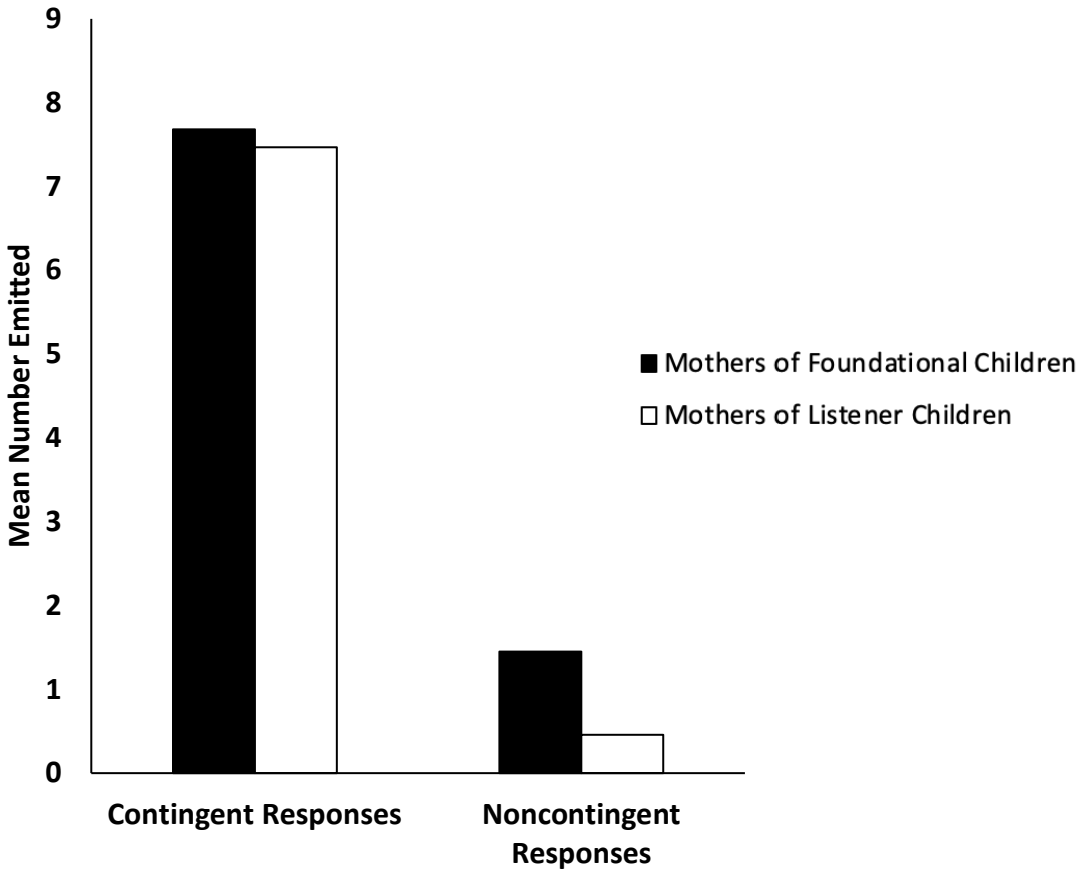

Figure 13. The mean number of contingent and noncontingent responses emitted by mothers of children at the foundational level of verbal development and mothers of children at the listener level of verbal development.

Research Question 4

The fourth research question asked: Was there a correlation between contingent and noncontingent consequences (each occurring as approvals, disapprovals, or corrections) and child's number of correct or incorrect responses during the cleanup task?

For this research question, separate bivariate Pearson's correlations were again performed for children at the foundational level of verbal development versus children at the listener level of verbal development. There was a positive relationship between contingent approvals and correct behaviors for children at the listener level of verbal development, $r(13) = .683$, $p = .01$, and noncontingent approvals were inversely related to correct behaviors for children at the

foundational level of verbal development, $r(20) = -.509$, $p = .015$. No other significant correlations between contingent and noncontingent consequences and correct responses emerged for children at the foundational level of verbal development or for children at the listener level of verbal development.

For children at the listener level of verbal development, contingent disapprovals and contingent corrections were positively correlated with incorrect behaviors, $r(13) = .561$, $p = .029$, and $r(13) = .582$, $p = .023$, respectively. In contrast, contingent approvals were inversely correlated for this group, and $r = -.632$, $p = .011$. For children at the foundational level of verbal development, the number of incorrect behaviors during the cleanup task was positively correlated with noncontingent approvals, $r(20) = .552$, $p = .008$, and with contingent corrections, $r(20) = .447$, $p = .037$. See Figure 14 for a visual representation of the correlations.

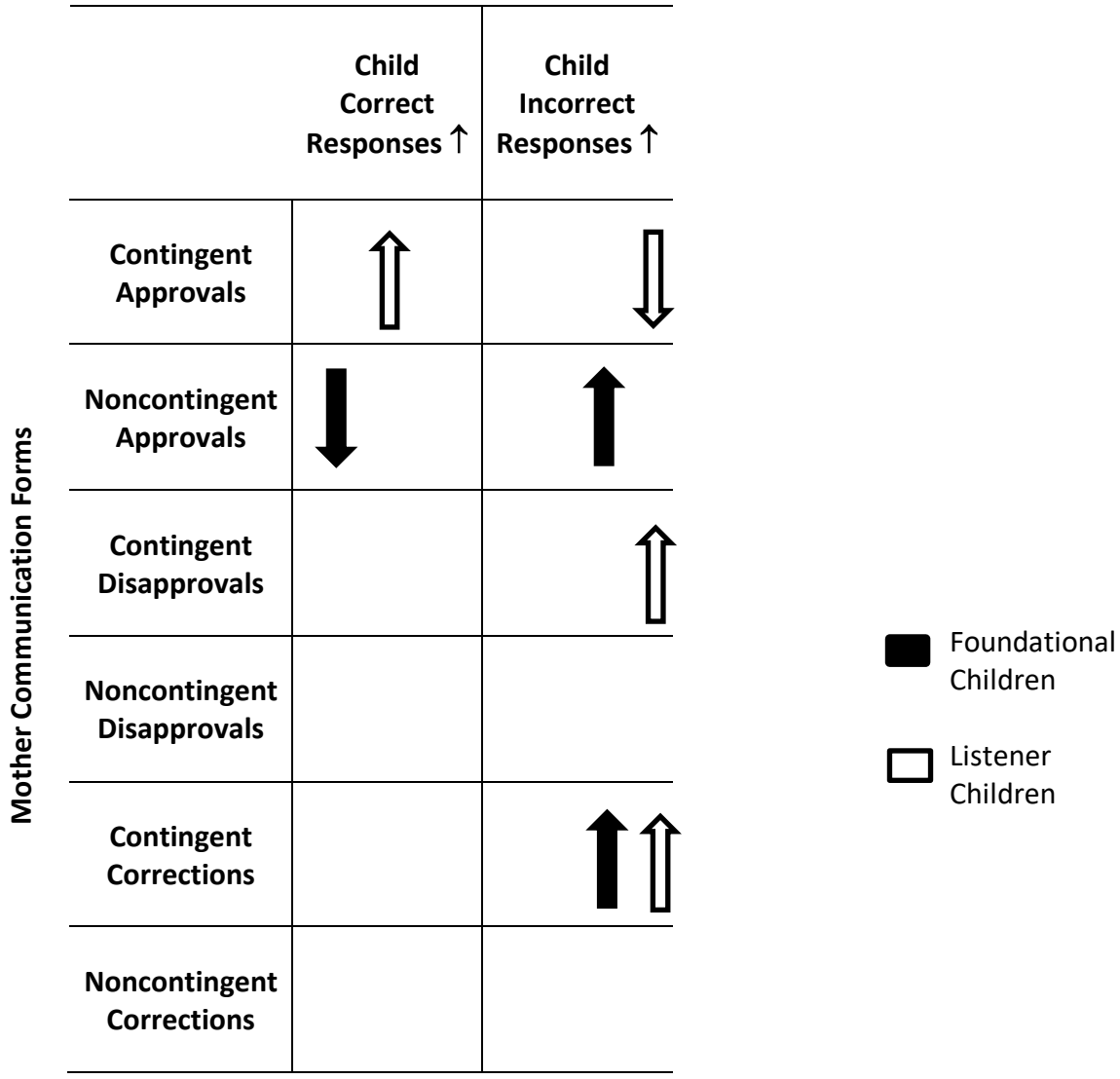

Figure 14. Significant positive and/or negative correlations (as indicated by directionality of arrows) between mothers' behaviors and child's behavior separated by child's level of verbal development.

Research Question 5

The fifth research question asked: What was the relationship between mothers' reported sense of self-efficacy, child level of verbal development, and behaviors emitted by mothers and their children? To answer this research question, I examined mothers' self-efficacy scores on the PSOC as a function of children's levels of verbal development, and the relation between self-efficacy and mothers' use of contingent and noncontingent responses, and their child's correct

and incorrect responses. Correct responses were measured in two ways: (1) total number of correct responses during the cleanup task and (2) percentage of correct *initial* responses following an antecedent[3]. Mothers with missing data on any of the 7 items of the PSOC were excluded from analyses ($N = 3$).

Comparison between mothers of children at the foundational level vs. mothers of children at the listener level of verbal development in their reports of self-efficacy. Results of an independent samples t-test did not reveal a significant difference between mothers of children at the foundational level and mothers of children at the listener level in self-reported parental self-efficacy, $t(32) = 1.462$, $p = .153$. On a Likert scale of 1 to 6, the mean PSOC score for mothers of children at the foundational level was 3.73, and the mean PSOC score for mothers of children at the listener level was 4.27 (see Figure 15).

[3] It should be noted that initial behaviors were defined as the child's *first* response to the mother's antecedent. This clarification is being made given that a child potentially had the opportunity to emit multiple responses during a single mother-child interaction. See *Child's Behaviors* section for a full explanation.

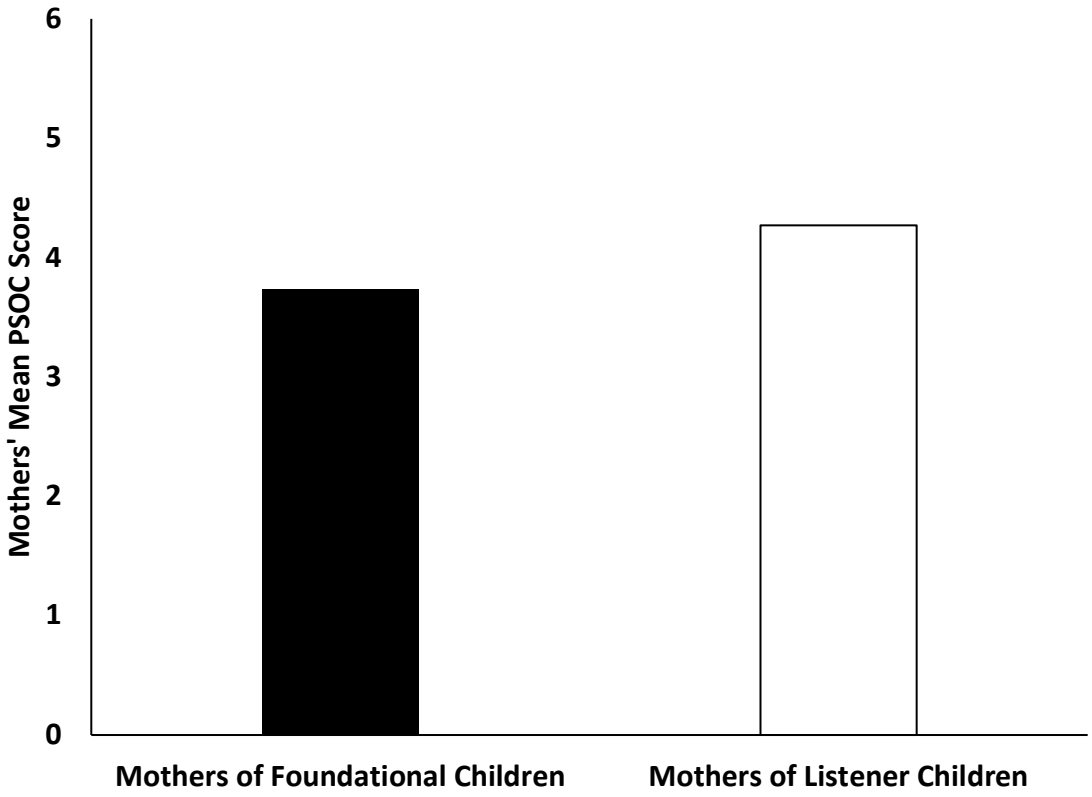

Figure 15. The mean PSOC scores for mothers of children at the foundational and listener levels of verbal development.

Associations between mothers' reported self-efficacy and observed behaviors emitted by the mother. Bivariate Pearson's correlations did not indicate a significant relationship between mothers' self-reported parental self-efficacy and frequency of emitting antecedents or consequences for children at either the foundational level or listener level of verbal development, all *p*s > .05. Additionally, within both levels of verbal development, there was no evidence of a relationship between mother's self-efficacy and total number of contingent responses across categories or total number of noncontingent responses across categories. This was also the case when examining contingent and noncontingent responses occurring as approvals, disapprovals, and corrections (all *p*s > .05).

Mothers' reported self-efficacy and responses emitted by the child. Pearson's correlations indicated that for mothers of children at the foundational and listener levels of verbal development, self-efficacy was unrelated to their child's total number of correct and incorrect responses during the clean-up task, all *p*s > .05. Additionally, an independent samples t-test found that children at the foundational and listener levels of verbal development did not differ in percentage of correct *initial* behaviors following an antecedent, $t(32) = -0.38$, $p = .970$. On average, mothers of children at the foundational levels of verbal development elicited a correct initial response 43.3% of the time and mothers of children at the listener level of verbal development elicited a correct initial response from their children 42.9% of the time (see Figure 16). Further, self-efficacy was not significantly correlated with percentage of correct initial behaviors, $r(35) = .005$, $p = .975$.

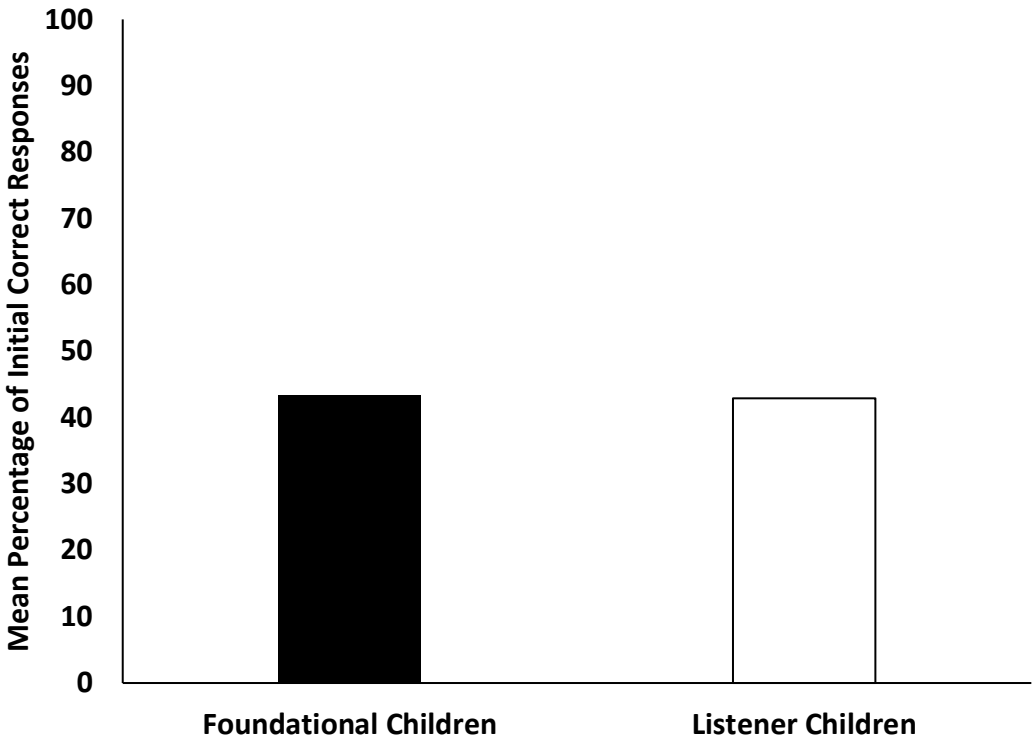

Figure 16. The mean number of *initial* correct responses for children at the foundational level of verbal development and the listener level of verbal development.

Chapter 4: Discussion

Summary of Findings

The rationale for conducting the current study was to examine how mothers communicate with their child with ASD during a compliance task, the relationships between communication forms and child responding, and whether the mothers' observed effectiveness related to her self-reported, self-efficacy score. Several research questions were asked in order to explore these concepts.

Mothers' Communication Forms and Child's Level of Verbal Development

For both mothers of children at the foundational and listener levels of verbal development, the predominant form of communication across antecedents and consequences was a combined approach. When examining antecedents and consequences separately, mothers were more likely to use a combined approach for antecedents and a vocal approach for consequences. Mothers of children at both levels of verbal development did not significantly differ in their frequency of antecedents or consequences based on their child's level of verbal development, nor did they differ in their use of forms based on their child's level of verbal development. These findings would suggest that mothers were not "sensitive" to or aware of their child's level of verbal development when communicating with their child. For example, children at the foundational level would have likely needed a majority of combined or nonvocal antecedents, given that a vocal only antecedent would probably not serve as a discriminative stimulus (S^D). Additionally, these children would have likely benefited from more combined or nonvocal consequences in order to reinforce correct responses and to punish incorrect responses.

Child's Level of Verbal Development and Mothers' Communication Form as Related to Child Responding

Children at both levels of verbal development did not significantly differ in their mean number of correct or incorrect responses. By definition, children at the listener level of verbal development have the stimulus control to respond to vocal directions (Greer & Ross, 2008). As shown in Research Question 1, mothers most frequently emitted antecedents using a combined approach, meaning they used a vocal antecedent combined with either a gestural or physical prompt. Children at the listener level of verbal development should have had the necessary cusps to attend to their mother's antecedent and to comply with instructions regardless of the form. Therefore, this group of children would have been expected to emit higher numbers of correct responses to their mother's directions. Since the data did not demonstrate a difference in correct responding across the two verbal development groups, it would suggest that the mothers lacked instructional control with their children. Coming under a parent's instructional control is determined by a child's reinforcement history. If there is not a history of contingent and reinforcing consequences for emitting correct responses, the parent will not establish instructional control. Conversely, a history of contingent and reinforcing consequences for emitting correct responses will establish instructional control and strengthen rule-governed behavior (Galizio, 1979). Given the low level of correct responding across both levels of verbal development, it can be inferred that vocal consequences did not function as an effective way of communicating (which would be expected for children at the foundational level of verbal development).

Examining the correlational analysis of child responding and forms of communication also yielded potentially useful results, but they must be interpreted with caution as the

correlations do not imply causation. For mothers of children at both the foundational and listener levels of verbal development, more antecedents (across all forms) were correlated with higher *incorrect* responding. Anecdotally, mothers were observed numerous times repeating antecedents when their child did not respond to their initial antecedent rather than providing a correction contingency or altering their antecedent (e.g., making sure the child was attending).

Additionally, for children at the foundational level of verbal development, higher incorrect responses were correlated with more combined interactions (antecedents and consequences summed), and for children at the listener level of verbal development, higher incorrect responses were correlated with more vocal interactions (antecedents and consequences summed). This is of interest because even when mothers were using potentially appropriate forms to communicate with their child, it still correlated with higher incorrect responding. This could further strengthen the arguments that not only did the mothers' antecedents not serve as a S^D, but that the mothers lacked instructional control.

Mothers and Contingent/Noncontingent Consequences

Another way to examine the mothers' communication was to examine whether her consequences were contingent or noncontingent. Correlational results showed that mothers of children at both levels of verbal development did not significantly differ in their use of contingent consequences. In other words, mothers of children at both levels emitted similar levels of contingent consequences. There was a statistically significant difference in the amount of noncontingent consequences that mothers of children at the foundational level emitted when compared to mothers of children at the listener level, but the number was not *functionally* significant due to the low level of noncontingent consequences across both groups (i.e., the mean

numbers were 1.45 and 0.46 for mothers of children at the foundational level and listener level, respectively).

Contingent/Noncontingent Responses as Related to Child Responding

One outcome of interest is that contingent disapprovals were positively correlated with incorrect responses for children at the listener level of verbal development. This could suggest that mothers' contingent disapprovals were reinforcing incorrect responding, or that the child's incorrect responding was creating a coercive feedback loop with the mother (Forehand, King, Peed, & Yoder, 1975; Patterson, 1982; Patterson, DeBaryshe, & Ramsey, 1989; Snyder, 1977; Wahler, & Dumas, 1984).

Another interesting correlation was that contingent corrections were positively correlated with *incorrect* responding for children at both levels of verbal development. This could imply two things: 1) the more incorrect responses emitted by the child, the more contingent corrections were given by the mother (which would be a positive parenting practice), or 2) the more contingent corrections given by the mother, the more incorrect responses emitted by the child (which would indicate the corrections were not effective). Given that children at both levels of verbal development emitted similar mean amounts of correct and incorrect responses, it would appear that the contingent corrections were either not frequent enough to reduce incorrect responding or were not appropriate to the child's level of verbal development.

Mothers' Self-Efficacy

Although the mean PSOC score for mothers of children at the listener level of verbal development was slightly higher, the difference between the two groups was not statistically significant. Additionally, there was no relationship between the mothers' PSOC score in terms of the number of antecedents and consequences emitted, nor in the number of contingent and

noncontingent consequences emitted, suggesting that in this study, contingent behaviors were not associated with high self-efficacy scores. Finally, mothers' PSOC scores were not correlated to the accuracy of their child's responding. Given the somewhat low initial correct responding to mothers' antecedents (43.3% correct responding for children at the foundational level and 42.9% correct responding for children at the listener level), it would appear that mothers for both levels of verbal development were not truly aware of how effective (or ineffective) they were, as evidenced by the their PSOC scores. To further examine this, I looked at the mean level of responding to the two most relevant statements from the PSOC in regards to child compliance. These two statements were: 1) E.1, "The problems of taking care of a child are easy to solve once you know how your actions affect your child, an understanding I have acquired," and 2) E.15, "I honestly believe I have all the skills necessary to be a good mother to my child." The mean response to these statements was "4" for mothers of children at the foundational level and "5" for mothers of children at the listener level. Both of these mean scores were *higher* than the mothers' overall mean PSOC score, which further supports that mothers' perceived self-efficacy did not correlate with their actual observed efficacy.

Implications

There were two main implications that could be derived from this study: 1) when communicating with their children, mothers were not responsive to their child's level of verbal development, and 2) the contingencies mothers were emitting were not effective in getting their child to complete a compliance task.

The findings of this research highlights the possibilities for effective parent training interventions. A first step would be teaching parents the importance of what communication forms are appropriate for their child's level of verbal development. Children at the listener level

of verbal development should require fewer prompts and respond more readily to vocal stimuli, while children at the foundational level may require the use of gestural and physical prompts in order to attend to stimuli (Greer & Ross, 2008). The mothers in this current study did not differentiate in their forms of antecedents and consequences emitted across the two levels of verbal development. Once parents understand the appropriate forms in which to communicate with their children, the use of contingencies in shaping their child's behavior can more effectively be implemented.

Investigating the mothers' use of contingencies demonstrated that they lacked the instructional control necessary to have their child comply with their directions. Research has shown that parent training packages using behavioral skills can help parents manage their children's behaviors and develop instructional control. Tarbox, Wallace, Penrod, and Tarbox (2007) used a three-step prompting procedure in order to increase compliance with caregiver requests. This intervention was not only effective in decreasing the frequency of caregiver prompts, but it was also effective in increasing child compliance to caregiver demands. Miles and Wilder (2009) employed a behavioral skills training (BST) package to teach caregivers to implement a guided compliance procedure during moments of noncompliance with their children. Results indicated that the BST improved the caregivers' performance of guided compliance and generalized across settings in follow-up probes.

Research from the educational field in using contingencies to develop instructional control may also be relevant to the current study at hand. The learn unit, which consists of bidirectional and interlocking "antecedents-behaviors-consequences for teachers and students" (Greer, 1994, p. 164), is considered to be one of the most "potent predictor[s] of effective instruction" (Albers & Greer, 1991, p. 352). Additionally, the higher the rate of intact learn units,

the more efficiently a child learns (Greer & Hogin-McDonough, 1999). The learn unit has also been shown to be effective in reducing noncompliant behaviors and establishing stronger instructional control (Kelly, 1994; Martinez, 1996). Kelly (1994) showed that an increase in learn units significantly reduced assaultive and self-injurious behaviors as compared to the use of a time-out procedure for children with severe developmental disabilities. Martinez (1996) also showed that an increase in learn units was effective in decreasing noncompliant behaviors. In her study, she compared the increase in learn units to the use of a differential reinforcement of other (DRO) behaviors procedure. Results showed that presenting a higher rate of learn units was more effective than the DRO procedure.

Research shows that learn units can also be implemented by parents within the home. Harden (1998) used a parent-training package that consisted of teaching basic tactics from applied behavior analysis with individualized training videos and feedback. Training and feedback involved parents giving clear and explicit antecedents and consequating the child's responses (i.e., delivering learn units). Results showed that a video training phase with immediate feedback using a *Parent Performance Rate and Accuracy* (PPRA) observation system increased the mothers' teaching skills and that this stimulus control generalized to other activities and behaviors within the home.

Limitations and Future Research

One limitation to this study was in regards to the contingent and noncontingent consequences. The value of this question could have been strengthened by recording the number of missed opportunities by mothers to consequate their child's behaviors. This would have provided an opportunity to better understand how often mothers were or were not providing

consequences, and further, to know if the percentage of behaviors consequated were contingent or noncontingent. Future studies would benefit from adding this as a variable.

Another limitation was the use of the PSOC scale. It is unclear if the PSOC scale was an effective way of measuring the mothers' perceived self-efficacy as it relates to the child's behaviors for the compliance task. The questions on the PSOC scale covered a broad range and were not specifically chosen for the research questions being asked in this current study. Questions that are more finely tailored to a compliance task would perhaps yield more insightful results. Future research could investigate whether significant relationships exist between mothers' self-reported, self-efficacy and their child's responding using a more appropriate measure.

An overall limitation to the study was the sample size across the two levels of verbal development (N=37), and the sample sizes within the two levels (N=22 for children at the foundational level and N=15 for children at the listener level). Future studies would benefit from a larger sample size, as well as groups that are more evenly distributed.

An additional overall limitation was that the level of parent training was not controlled for when the mothers were recruited. As part of the school's educational model, parent training was offered through in-person workshops and literature. Whether or not parents had attended workshops or had been exposed to the literature was not controlled for in this study. Anecdotally, this experimenter did observe various levels of behavioral expertise of mothers when working with their children during the compliance task. Some mothers did implement behavioral tactics (e.g., least-to-most prompting, ensuring the child was attending to antecedents, and appropriately consequating the child), while most mothers did not emit any observable behavioral tactics.

It must be remembered that the measures of parent/child interactions in this study covered a brief snapshot in time for the mothers and their children. Setting events (e.g., a change in daily routine and setting) may have impacted the way the children and the mothers responded to one another. Future researchers may want to observe how mothers and children interact in the home when completing a compliance task as it may yield different results.

Since the mothers in this study demonstrated that they lacked instructional control, future research may want to compare the effectiveness of the child's teacher versus the child's mother in the same compliance task. Given that the teachers of the children in this current study were all trained in the CABAS® (CABAS Schools, 2019) methodology (which applies the principles of behavior analysis across the school day), it would provide a baseline for whether the children had the stimulus control to respond during a compliance task. If the children did respond more readily to the teacher, it would further strengthen the argument for behavior analytic parent training. Additional research may also want to break down the foundational level of verbal development further. The current study categorized children having zero to all five foundational cusps as being at the foundational level. It may be of interest to examine the responding of children with zero cusps in repertoire as compared to the responding of children with one or more foundational cusps in repertoire. Conversely, it may also be of interest to separate out the bidirectional level of verbal development from the listener level of development as was done in Briggs-Greer (2018).

Conclusion

Results of the study showed that mothers of children at the foundational level and mothers of children at the listener level did not differ in their communication forms, nor was one group of mothers more effective than the other when engaging their children in a compliance

task. Also, the mothers' self-reported, self-efficacy score did not accurately reflect how ineffective the mothers actually were when having their child comply and clean up. Educating parents on how to communicate with their children based on their child's level of verbal development and how to create effective contingencies may help families have more success, not only during a compliance task, but during day-to-day scenarios. As educators and behaviorists, it is our duty to help disseminate best practices to families in order to increase the parents' and child's well-being.

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Appendix A

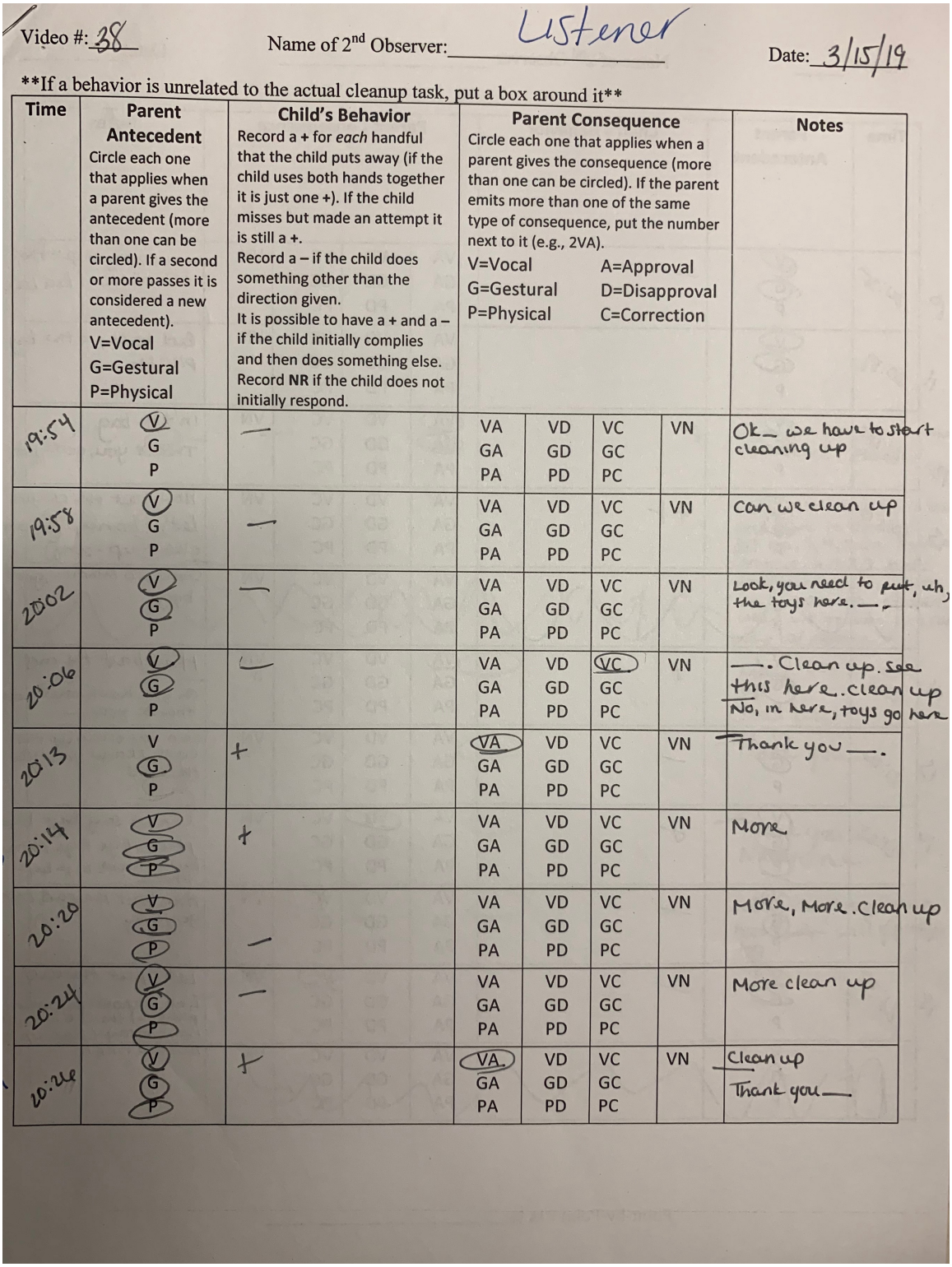
Front-facing camera view of room setup for experimental scenarios.

Appendix B

Rear-facing camera view of room setup for experimental scenarios.

Appendix C

Example of a completed data sheet.



Video #: 38 Name of 2nd Observer: Listener Date: 3/15/19

If a behavior is unrelated to the actual cleanup task, put a box around it

Time	Parent Antecedent Circle each one that applies when a parent gives the antecedent (more than one can be circled). If a second or more passes it is considered a new antecedent). V=Vocal G=Gestural P=Physical	Child's Behavior Record a + for *each* handful that the child puts away (if the child uses both hands together it is just one +). If the child misses but made an attempt it is still a +. Record a – if the child does something other than the direction given. It is possible to have a + and a – if the child initially complies and then does something else. Record **NR** if the child does not initially respond.	Parent Consequence Circle each one that applies when a parent gives the consequence (more than one can be circled). If the parent emits more than one of the same type of consequence, put the number next to it (e.g., 2VA). V=Vocal A=Approval G=Gestural D=Disapproval P=Physical C=Correction				Notes
19:54	(V) G P	–	VA GA PA	VD GD PD	VC GC PC	VN	Ok – we have to start cleaning up
19:58	(V) G P	–	VA GA PA	VD GD PD	VC GC PC	VN	Can we clean up
20:02	(V) (G) P	–	VA GA PA	VD GD PD	VC GC PC	VN	Look, you need to put, uh, the toys here. –
20:06	(V) (G) P	–	VA GA PA	VD GD PD	(VC) GC PC	VN	–. Clean up. See this here. clean up No, in here, toys go here
20:13	V (G) P	+	(VA) GA PA	VD GD PD	VC GC PC	VN	Thank you –.
20:14	(V) (G) (P)	+	VA GA PA	VD GD PD	VC GC PC	VN	More
20:20	(V) (G) (P)	–	VA GA PA	VD GD PD	VC GC PC	VN	More, More. Clean up
20:24	(V) (G) (P)	–	VA GA PA	VD GD PD	VC GC PC	VN	More clean up
20:29	(V) (G) (P)	+	(VA) GA PA	VD GD PD	VC GC PC	VN	Clean up Thank you –

Appendix D

Self-efficacy PSOC portion of the parent questionnaire given to mother's during the competing demands task.

Section E							
Instructions: Please rate the extent to which you agree or disagree with each of the following statements.							
		Strongly Disagree **1**	**Somewhat Disagree** **2**	**Disagree** **3**	**Agree** **4**	**Somewhat Agree** **5**	**Strongly Agree** **6**
E.1	The problems of taking care of a child are easy to solve once you know how your actions affect your child, an understanding I have acquired.	1	2	3	4	5	6
E.6	I would make a fine model for a new mother to follow in order to learn what she would need to know in order to be a good parent.	1	2	3	4	5	6
E.7	Being a parent is manageable, and any problems are easily solved.	1	2	3	4	5	6
E.10	I meet by own personal expectations for expertise in caring for my child.	1	2	3	4	5	6
E.11	If anyone can find the answer to what is troubling my child, I am the one.	1	2	3	4	5	6
E.13	Considering how long I've been a mother, I feel thoroughly familiar with this role.	1	2	3	4	5	6
E.15	I honestly believe I have all the skills necessary to be a good mother to my child	1	2	3	4	5	6